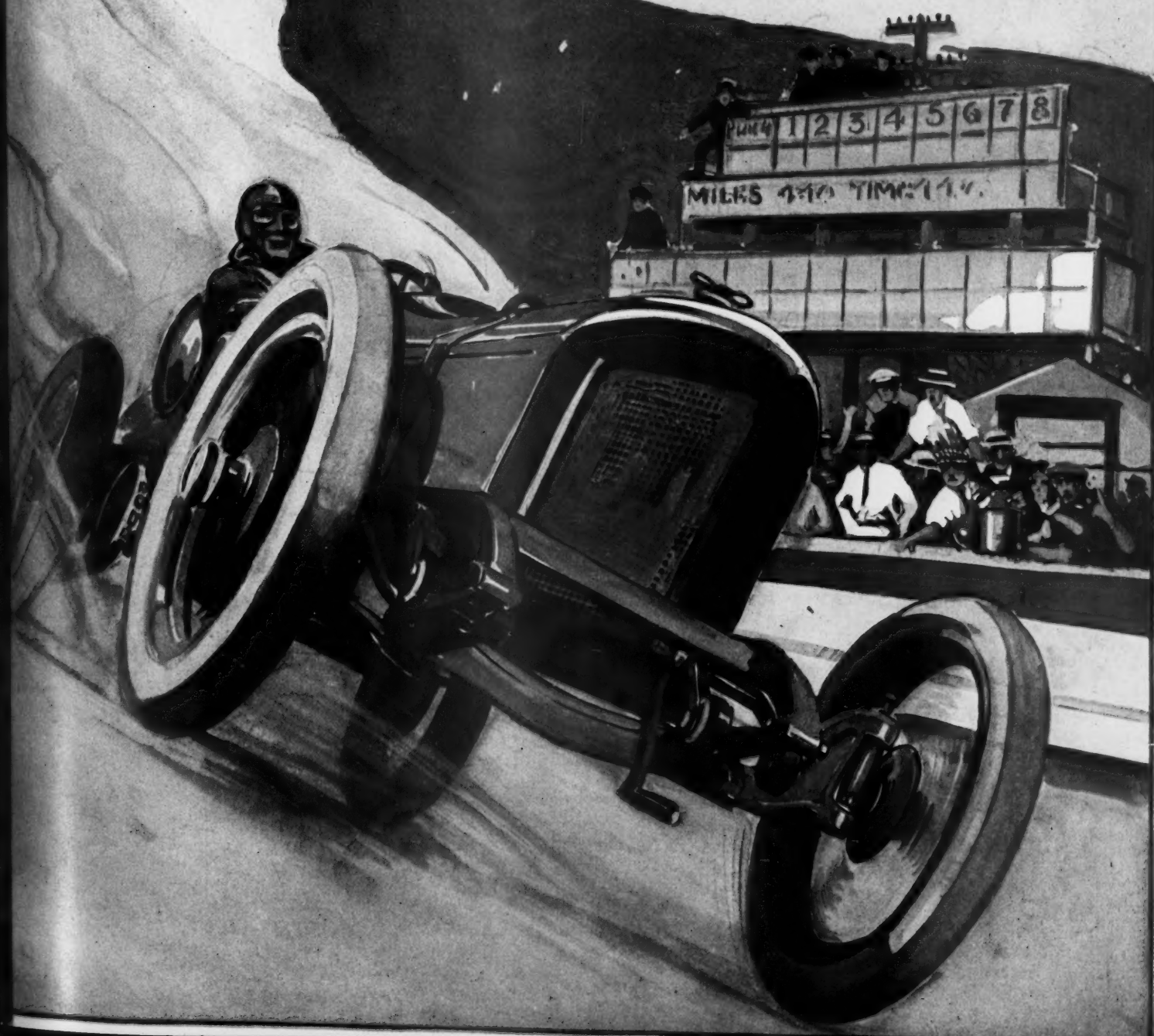


MAY 28, 1914

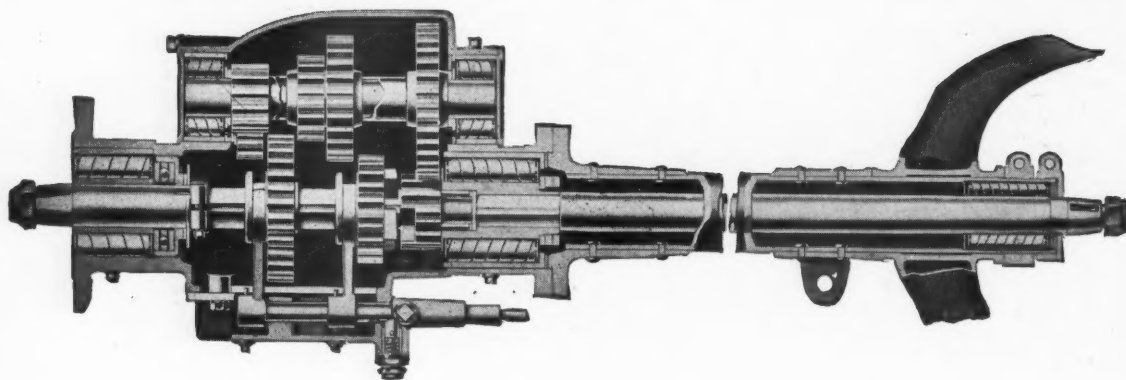
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MOTOR AGE



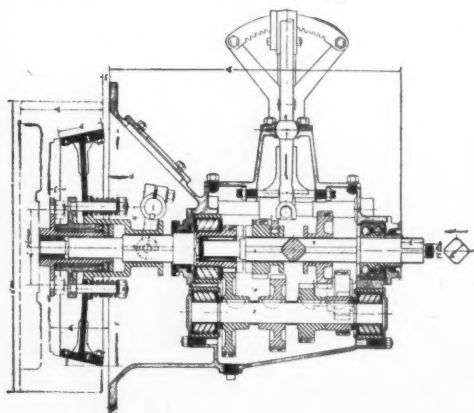


The Proven Standard **COVERT** Transmissions



The many years of "satisfaction service" rendered by Covert Transmissions have made them the accepted standard in the transmission field—proven by long and hard use in both pleasure cars and commercial vehicles.

This achievement is the direct result of an unceasing endeavor to give our customers the best in design, materials and workmanship, backed up by a very liberal service policy.



Covert Transmissions are made in various sizes and of the unit power plant, rear axle and jackshaft types, suitable for large or small commercial cars or automobiles. The leading axle manufacturers have made their flanges to fit the Covert construction while the unit power plant models are standardized.

Our engineering department is at your service at all times.

Covert Motor Vehicle Company

Factory
Lockport, N. Y.

Sales Office
Detroit, Mich.

TRANSMISSIONS

DAY TIRE VALVE

does away forever with tire valve troubles. It has no springs or other delicate parts to become deranged. The Day Valve has but three parts—only one working part—as against seven complicated parts in old style valves.

It outlasts other valves because of its simple and heavy construction—is absolutely leakproof—is interchangeable without danger of affecting the working part—can be removed for deflation in one-tenth the time required by old style valves.

With the Day Valve you can pump the biggest tire with a foot pump in one-third the time and with one-third the number of strokes. Its air passage is three times as large and you don't have to overcome the 30-pound back pressure of the spring resistance in old style valves. All your effort goes to sending air into the tire.

Price, 50 cents for a set of 5 Valves
Satisfaction guaranteed or money back

The Day Tire Valve offers one of the biggest propositions for dealers that has ever come into the automobile accessory field. You know the number of automobiles in your territory; and every one is equipped with five tire valves. Read about the Day Tire Valve and you'll see at once that a majority of car owners are going to buy the Day Valve. A big advertising campaign is going to tell car owners about this new valve. Stock up now and be ready to meet the demand. Read the dealer's proposition in the coupon and rush your order today. We'll rush the goods to you. The fact that the Day Tire Valve is made by the "Tire-Doh" people is your best assurance of satisfaction.

Illustration at the left is sectional view of the valve showing position of plunger and air passage when the valve is open.

18 Other TIRE-DOH Products

Every One a Necessity for the Man Who Drives a Car

Tire-Doh.....	\$1.00	Sta-On Engine Paint.....	\$0.40
Silver Quick.....	1.00	Body Gloss.....	.50
Stop That Radiator Leaking.....	.50	Renew-O Leather Dressing.....	.75
No-Leak Waterproof Top Dressing.....	.75	Chemico Blowout Patch.....	.50
X-Ray Top Dressing.....	.75	Nu-Stain Top Lining Dye.....	.50
See-Kleer.....	.50	Sunshine Metal Polish.....	.25
Preserv-O Tire Paint.....	.50	Everwear Nickel Polish.....	.25
No-More-Rust Rim Paint.....	.50	Blac-Namel.....	.75
Destroy-O Carbon Remover.....	.75	Metal-Lac.....	.75

Illustration at the right is sectional view of the valve with the cap on showing position of the plunger when valve is closed.

Send for our big dealer's proposition and our free booklet "Keeping the Car New"

ATLAS AUTO SUPPLY COMPANY
3243 W. Lake Street :: CHICAGO, ILLINOIS

Dealer's Coupon

Atlas Auto Supply Co.
3243 W. Lake Street, Chicago, Ill.

Rush shipment of.....dozen sets Day Tire Valves upon condition that I can return same if your prices and proposition to dealers are not satisfactory.

Name.....

Street.....

City.....

Buyer's Coupon

Atlas Auto Supply Co.
3243 W. Lake Street, Chicago, Ill.

Enclosed find \$.....for which send me.....sets of Day Tire Valves. It is understood that I can return them if they are not satisfactory.

Name.....

Street.....

City.....

When Writing to Advertisers, Please Mention Motor Age.

Hartford

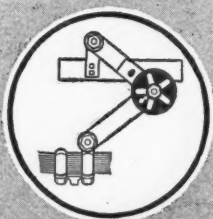
AUTO COMFORT

EQUIPMENT

THE HOME OF HARTFORD AUTO COMFORT EQUIPMENT

Modern automobile accessories of merited distinction, each a quality product and the leader in its class—designed to ensure comfort, to promote economy, and to increase the factor of safety.

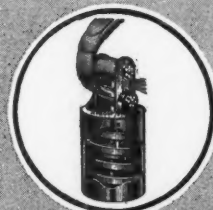
Truffault-Hartford SHOCK ABSORBER



Prices—Five Models.
\$60, \$50, \$35, \$16.
Special Ford Type, \$16.

"The Pioneer and the Best." The only shock absorber employing the invaluable principle of Rotary Friction. Gives springs full play but not free play. "Makes Every Road a Boulevard," for any car at any speed. Combines economy with comfort by increasing tire mileage, preventing spring breakage and overcoming destructive vibration. Used by 250,000 motorists. Adopted by 25 leading makers.

Hartford CUSHION SPRING



Prices—Four Models.
\$35, \$30, \$25.
Special Ford Type, \$16.

Gives springs the flexibility necessary to banish the continual annoyance of small jars and jolts produced by car tracks, cross-walks, cobblestones, etc. Assures the same comfort in ordinary travel over average roads as Truffault-Hartford Shock Absorbers give on rough roads. Together, these devices offer comfort plus. Hartford Cushion Springs are easily applied to any car.

Hartford Bumper

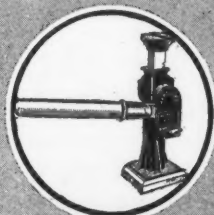
Absorbs the shock of collision without jolt to passengers or damage to car. Adds the final touch of smartness to any car. Saves repair bills by preventing smashed headlights, damaged radiators, twisted mud guards, etc. Attached to any car in 15 minutes. Four sizes—\$15, \$12.50 and \$10.00. Special Ford Type, \$10.



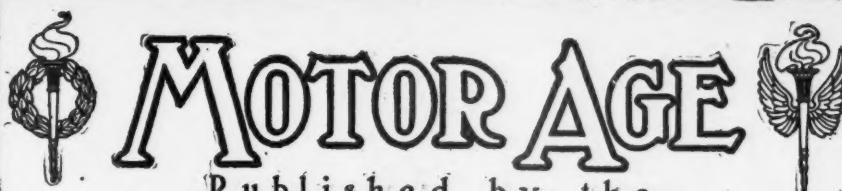
Guarantee: "Money back if not satisfactory." Under this broad policy all Hartford products are sold. Any article of our manufacture not proving satisfactory after 30 days' trial from date of purchase, can be returned and the purchase price will be refunded.

Hartford Auto-Jack

Strong, Efficient, Rapid, Reliable, Easy Working—the best of its kind. Handsome in appearance—lifts a heavy car with wonderful ease. Just a simple wrist movement required. Costs a little more, but worth it. Price, \$6.50.



HARTFORD SUSPENSION CO. E. V. HARTFORD, Pres.
Main Office and Works: 146 Bay St., Jersey City, N. J.
Manufacturers of Hartford Electric Starting and Lighting System
Branches in all principal cities Dealers everywhere



Published by the
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910 South Michigan Avenue
CHICAGO ILLINOIS

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Volume XXV

MAY 28, 1914

No. 22

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Wastebasket Circulation

"No," the busy man told our advertising representative, "no, we're not going to do any further advertising in Motor Age or The Automobile this season."

The busy man had a stack of morning mail before him half a foot deep. As he talked, he slit envelope after envelope, and, in a matter of habit way, tossed a dozen or more form letters, circulars and catalogues into the wicker.

"No, we're going to cut out our class paper advertising and concentrate on a direct-to-the-consumer campaign. We're going to use catalogues, circulars and form letters."

And the busy man went on slitting the morning mail!

* * *

To send a form letter or circular under two-cent postage to every name on Motor Age's subscription list would cost an advertiser \$460.00 in postage alone. Printing, addressing and clerical work would almost double that amount and total about eight times the cost of a full page Motor Age advertisement directed to 23,000 interested readers.

And advertisers in Motor Age can rest assured that their announcements will not wind up in the wastebasket. The subscriber who pays \$3.00 a year in hard, cold cash for Motor Age does not do so out of charitable motives. He has paid for an interest in that paper!

MOTOR AGE

910 S. Michigan Ave.

CHICAGO, ILL.

Two Unit Starting - Lighting

Simpler, safer and very much more efficient than the Single Unit.

The advantages of the Two Unit system are clearly defined and immediately apparent to anyone who has investigated the merits of both principles.

With the Two Unit system, ONE device is used for starting—and nothing else.

With the Two Unit system, ONE device is used for generating—and nothing else.

The result is specialized effort in each function and, therefore, greater efficiency.

The Single Unit system **MUST** be a compromise. It is asked to produce starting, lighting and sometimes the ignition function as well.

Why not have the Two Unit system where efficiency is concentrated? You will receive greater satisfaction, you will secure maximum power for starting, maximum current for lighting, and the most approved design in electric equipment. More expensive to the manufacturer, perhaps—but certainly worth the difference.

The invariable selection of those who know—

GRAY & DAVIS
STARTING - LIGHTING SYSTEM
Boston, Mass.

MOTOR AGE

Speed

Man, Bird, Beast and
Other Mechanisms
Must Bow Before
the Motor Car



ANTICIPATE 2 days. It is 4 o'clock on the afternoon of Saturday and Victory and Defeat are about to make their claims on the participants in the annual 500-mile international sweepstakes at Indianapolis.

Grimy men are matching courage, strength and cunning for a fortune. Their faces are drawn, their eyes are bloodshot, their lips are parched and their hands and legs are numb. Grease-splattered motor cars thunder over the slippery bricks of

the red oval. Engines are sounding a raucous challenge and exhausts are spitting fire and smoke like mythical dragons of old. Burning tires and castor oil pollute the spring air with nauseating odors. In the long gray stands over which fly the flags of a world's nations are massed, tier upon tier, thousands of spectators—a black embankment of thrilled, yelling, expectant humanity, a living frame for this masterpiece of motion.

Speed the Keynote

What prompts this daring, this labor, this frenzy of a national holiday? The question can be answered in a single word—Speed.

In one respect at least, we are all pa-

Speed—The Fastest Flights

Motor Car—142.9 m.p.h. Flying kilometer (.621 of a mile or 1092.96 yards) made in 15.64 seconds by Arthur Dury in the 300-horsepower Fiat at Ostend, France, December 16, 1913.

Electric Trolley—128.55 m.p.h. Average speed made by an electric trolley in a government test over the Berlin-Zossen road in 1902.

Aeroplane—126.05 m.p.h. Average speed made by Maurice Prevost over a 125-mile course at Rheims, France, in September, 1913.

Steam Locomotive—126 m.p.h. Average speed made March, 1911, in a run from Fleming to Jacksonville, Fla., by a Plant system locomotive over a distance of 5 miles; time, 2:30.

Motorcycle—100 m.p.h. Average speed made by Lee Humiston on an Excelsior in January, 1913. Time for 1 mile, 36 seconds.

Pigeon—85.6 m.p.h. Average speed made by bird owned by E. J. Lautz of Buffalo, N. Y., in 100-mile flight in 1900.

Cyclecar—72.57 m.p.h. Average speed of Singer car in 1-hour time trial held on the Brooklands track in 1913.

Motor Boat—64.41 m.p.h. Average speed made by Maple Leaf IV in winning Harmsworth cup international races off the Isle of Wight in September, 1913. Time for 42.4 miles, 39:29 3-5.

Bicycle—63 m.p.h. Made by Paul Guignard behind motor pace at Munich, Germany, September 15, 1909, in 1-hour time trial.

Running Horse—42.35 m.p.h. Average speed made by Bob Wade in ¼-mile race at Butte, Mont., August 20, 1890. Time, 21¼ seconds.

Trotting Horse—33.33 m.p.h. Average time made by Uhlman in ¼-mile race at Lexington, Ky., October 2, 1913. Time, 27 seconds.

Pacing Horse—32.72 m.p.h. Average speed of Dan Patch in ¼-mile time trial held at Memphis, Tenn., October 27, 1903. Time, 27¼ seconds.

Steamship—30.53 m.p.h. Average speed made in fastest day's run of the Mauretania, covering 673 knots, in June, 1909.

Ice Skater—27.19 m.p.h. Average speed made in mile-race by Tim Donoghue in February, 1887. Time, 2:12 3-5.

Running Man—21.75 m.p.h. Average speed made by R. E. Walker in establishing world's record of 9 2-5 seconds for the 100-yard dash.

Roller Skater—20.44 m.p.h. Average speed made by Harry Becker in 100-yard race at Chicago in 1910. Time, 10 seconds.

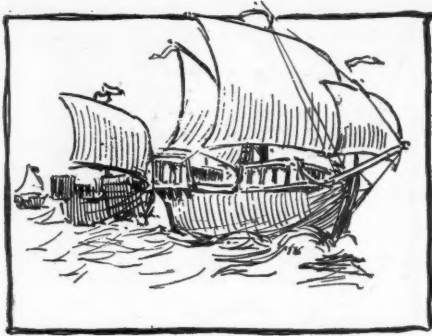
Rowing—15.75 m.p.h. Average speed made in ¼-mile single scull straightaway race by Edwin Henley at Newark, N. J., July 11, 1901. Time, 57 seconds.

Pedestrian—9.11 m.p.h. Average speed made by W. Perkins in 1-mile walk in 1874. Time, 6:23.

Swimming—4.52 m.p.h. Average speed made by Duke Kahanamoku in swimming 25 yards in 11.3 seconds off San Francisco, August 6, 1915.

gans. In this, the twentieth of the Christian centuries, we worship a god at whose shrine the Romans built eternal fires 4,000 and more years ago. That god is Mercury, speed divinity.

Mighty is speed! It has been the requisite of man since the day of the creation. It has been measured by the sands of the hour glass, the hands of the sun dial, the clock and the watch, the needle of the most delicate chronometer. Countless generations have hailed as popular idols the possessors of it. Without speed, Phai-



COLUMBUS SAILED TO AMERICA
IN 70 DAYS OR ABOUT 2½ TO 3 MPH.



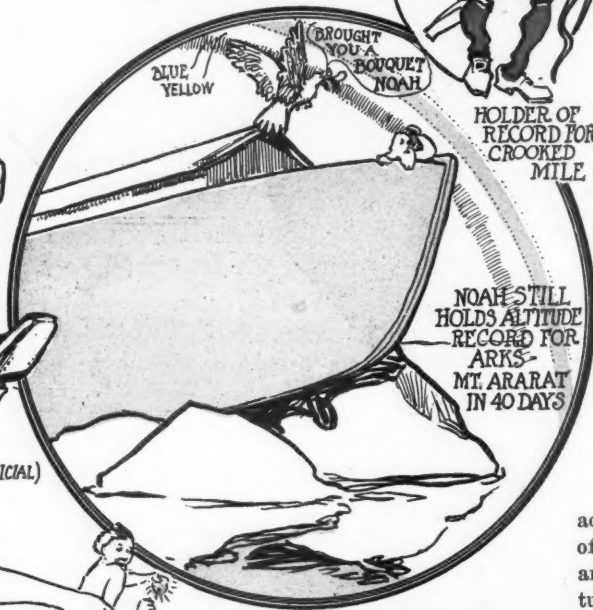
THE ORIGINAL
MARATHON RUNNER



HOLDER OF
RECORD FOR
CROOKED
MILE



WONDERFUL SPEED OF THE
SEVEN LEAGUE BOOTS (UNOFFICIAL)



NOAH STILL
HOLDS ALTITUDE
RECORD FOR
ARKS-
MT. ARARAT
IN 40 DAYS



HIPPOMENES SETS FIRST RECORD
IN 100 YARD DASH; DEFEATING THE
SUIFRAGETTE ATLANTA BY A MEAN TRICK

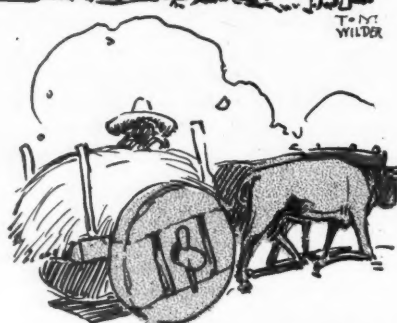


HIGH SPEED IN THE STONE AGE

HEAP FAST!
BREAK 'EM NECK



NEW YORK TO BOSTON IN 6 DAYS 1774



QUICK SERVICE DELIVERY IN MEXICO

maw. In the person of Paul Revere and his nameless horse, it called the patriots of the American colonies to arms on the night of the fifteenth of April, 1775. Had Marshal Ney possessed more of it on the morning of June 15, 1815, Waterloo might have been a French victory and Napoleon's dream of an Alexandrian empire a reality to-day. It rode in the saddle with Phil Sheridan through the valley of the Shenandoah on the nineteenth of October, 1864, and shattered the last despairing hope of the starved Confederacy.

In the Days of Old

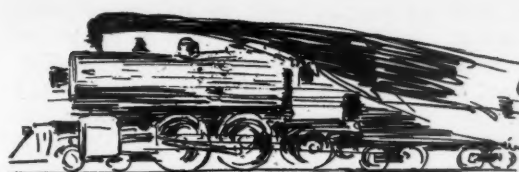
Among the ancient Egyptians, speed was symbolized by the scarab or sacred beetle. By the Romans, it was personified by a lithe-limbed youth, a god with winged cap, sandals and caduceus. The eagle, soaring over mountain and plain; the deer, darting through the dense forest, represented speed to the American Indian. But neither insect nor god, bird nor beast, is accepted as a symbol of speed in this age of astounding velocity. Creatures of flesh and blood have given way before creatures of iron and steel in the perpetual race against time and among the space-conquering mechanisms of the twentieth century, the motor car is supreme.

It has been only within the last half decade that this rubber-shod upstart, this giant of steel has earned the title of the fastest of all creatures, animate and inanimate. In the past 4 years Mercury has placed the crown, emblematic of speed preëminence, on the heads of three motor car drivers and acknowledged their right to boast of having traveled faster than any human being ever traveled before. Barney Oldfield and Bob Burman, at the wheel of the historic Blitzen Benz, and Arthur Duray, guiding the 300-horsepower Fiat, each in his turn have made the "sands of time" something other than a poetic idiom and on the smooth beaches of Dayton-Ormond and Ostend established new records for flight.

Of this triumphant trio, Oldfield was the first to force the electric trolley to acknowledge the supremacy of the motor car. Until that memorable March morning 4 years ago when Barney stepped on the throttle of the Benz and sent the German car over the Florida sands at a rate of 131.75 miles an hour, a trolley car held the record for supreme speed, 128.55 miles an hour made in a government test over the Berlin-Zossen road in 1902.

dippides probably would have died in obscurity instead of being honored to this day as the runner who bore the news of the Persian defeat on the plains of Marathon to Athens. Speed swept Ben Hur into the pages of fiction and placed the skeleton of the trotter, Nancy Hanks, in the Smithsonian Institution at Washington.

Speed has decided the destiny of nations. It carried Xenophon and the remnants of his army out of the Persians'



STEAM LOCOMOTIVE 120 M.P.H.

At the time of Oldfield's achievement, the steam locomotive already had bowed before the motor car. Fred Marriott had driven the Stanley steamer at a rate of 127.66 miles an hour in 1906 and had eclipsed the best record of a descendant of Stephenson's coal-eating monster, 120 miles an hour made in March 1901 by a Plant system locomotive on a run from Fleming to Jacksonville, Fla. Marriott also verified a prediction made less than a year previous by George M. Sands of the New York Globe and Commercial and contributing editor to the Americana, who wrote:

"For years the railroad locomotive has stood alone as the maker of the fastest possible mile, but the coming of the motor car has provided a rival which may not improbably succeed at last in reducing the record of even the fastest train. In 1894 such a statement would have been regarded as scarcely worthy of consideration, for the motor car was so largely an object of experiment that speed was regarded as somewhat of a minor consideration when compared with the infinite details of workmanship on which the successful manipulation of the machine itself depended. So far from being a remote possibility, however, the persistent increase in speed of the motor car has brought its record so much nearer that of the locomotive that they are now separated by a small fractional part of a minute and there is no question that, under equally favorable circumstances, the difference will be partially if not entirely obliterated."

Oldfield's Speed Flight

Oldfield was secure in his title of speed king for a little more than a year. Then in April, 1911, the Benz was groomed for another time trial. When it was sent away, Bob Burman, instead of the cigar-chewing veteran, was at the wheel. Successful attempts to lower the flying kilometer, mile and 2-mile marks resulted in the dethronement of Barney and the coronation of a new monarch of velocity. Burman drove the mile in 25.4 seconds, or at a rate of 141.73 miles an hour, and took from Oldfield his chief stock in trade, his coveted record that had made him a great attraction in his barnstorming campaign.

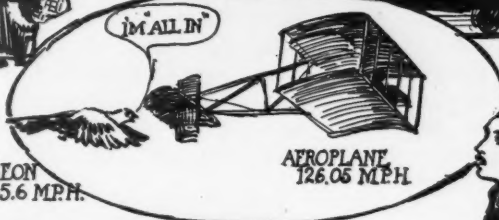
But Burman was destined to meet the

WIRE AHEAD MADAM
CAN'T GET ER STOPPED NOW
THIS SIDE OF HARMONY

ILL REPORT YOU

PIGEON
85.6 M.P.H.

"M'ALL IN"

AEROPLANE
126.05 M.P.H.ELECTRIC TROLLEY
128.55 M.P.H.

GOSH! I BET
THAT CAN
GO FASTER
A AUTO!

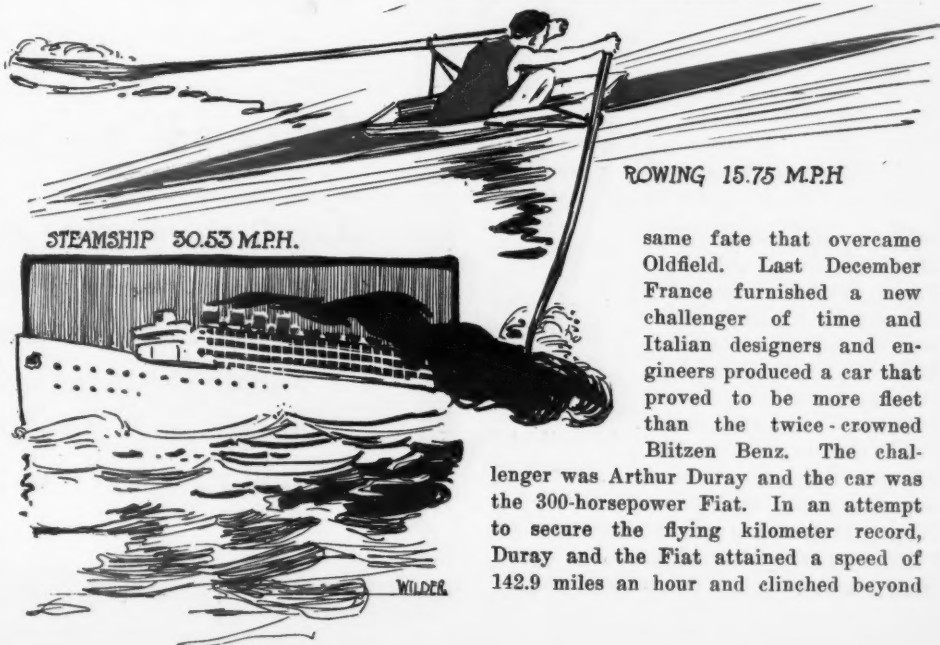
MOTOR BOAT
64.41 M.P.H.RUNNING MAN
21.75 M.P.H.MOTOR CAR
142.9 M.P.H.

OOH!!
WHO'S THAT?
BARNEY OR
DURAY?

MUST BE BARNEY
BET I CAN BEAT ANY
OF THEM GOING
SIDEWISE



TROTTING HORSE 33.33 M.P.H.



STEAMSHIP 30.53 M.P.H.

ROWING 15.75 M.P.H.

same fate that overcame Oldfield. Last December France furnished a new challenger of time and Italian designers and engineers produced a car that proved to be more fleet than the twice-crowned Blitzen Benz. The challenger was Arthur Duray and the car was the 300-horsepower Fiat. In an attempt to secure the flying kilometer record, Duray and the Fiat attained a speed of 142.9 miles an hour and clinched beyond

WILDER

all doubt the claim of the motor car to world's speed honors.

Just as 8 years ago the supremacy of the locomotive was challenged by the motor car, so today the latter has a dangerous rival in another mechanical upstart, the aeroplane which has an unofficial record of 165 miles an hour in a flight with a strong wind behind it. In fact, Duray's Fiat might have to exert itself to defeat the holder of the world's speed record in the air, the biplane in which Maurice Prevost averaged 126.05 miles per hour in the Gordon Bennett cup race of 1913. Compare this record with that of 1909—49.99 miles per hour made by Leon Delagrangé at Doncaster, England—and the battle with time as waged by the aeroplane is as spectacular and sensational as the attempts of the motor car to crowd miles within a fleeting minute.

Man, beast, bird and other mechanisms, however, have yet to equal, let alone better, the official record of the motor car. Match Duray and the Fiat against the swiftest aeroplane, steam locomotive, electric trolley, steam boat, motor boat or motorcycle; against the fleetest pigeon, trotter, pacer or running horse; against the fastest runner, swimmer, skater or rower and the combination of driver and motor car could give them all a handicap and defeat them in a race of any distance from 100 yards up. This sounds like an extravagant, an arrogant claim, but compare the speed records and you will find that it is true.

Just Supposing

Merely for the sake of illustration and with no intention of joining the overcrowded ranks of the promoters, let us pit Duray's Fiat against Prevost's aeroplane. Here's a tip straight from the feed box—take the motor car at any odds you can get. In a 125-mile race, the Fiat could give the biplane a start of 6 minutes and cross the tape a winner by 36 seconds, provided each equals the speed made in establishing their world's records. Duray's time would be 52 minutes 48 seconds; Prevost's, 59 minutes 24 seconds.

In a 5-mile race with the holder of the locomotive speed record of 120 miles an hour, the 300-horsepower Fiat could allow its giant rival a 20-second handicap and win by a margin of 6 seconds. The times of the two contestants would be: Locomotive, 2 minutes 30 seconds; motor car, 2 minutes 6 seconds.

It would be a shame for Duray to take the money in a brush with the fastest of steamships, the *Mauretania*, which established a speed record for ocean greyhounds in June, 1909, when it averaged 30.53 miles per hour in a day's run of 673 knots. E. Mackey Edgar's "Maple Leaf IV" winner of the Harmsworth cup motor boat races of 1913, would give the Fiat a more exciting race, if the two were matched, than the *Mauretania*. The international trophy victor covered a 42.4 mile course in 39 minutes and 29 3-5 seconds, at an average speed of 64.41 miles

per hour. The Fiat's time for the same distance would be 16 minutes 54 seconds.

In a 1-mile race with Lee Humiston, holder of the motorcycle 1-mile record of 36 seconds, Duray would finish 10.8 seconds ahead of his rival, the average speed of the Fiat for 1 mile being 25.2 seconds.

Motor Car vs. Running Horse

Salvator, holder of the 1-mile straight-away record of 1 minute 35½ seconds for running horses; Uhlan, king of trotters, with a mile mark of 1 minute 54½ seconds; and the pacer, Dan Patch, who

holds the 1-mile record for side-wheelers of 1 minute 55 seconds, would be among the also rans in a race with the Fiat, if any tout should step up and ask you. The average speed of the three equine champions is as follows: Salvator, 37.6 miles per hour; Uhlan, 31.39 miles per hour; Dan Patch, 32.43 miles per hour. In a match race, Duray would lap them four times and have yards to spare.

R. E. Walker, the South African

The Thrill

By J. C. Burton



A track of brick that glares in the sun,
Slippery with oil, a treacherous sheen;
Turns where the fates may make morbid fun,
Turns where steel monsters pitch and careen;
Stage trod by Triumph, Defeat and Despair,
Cauldron of courage for men meeting there.

Gray stands that shake with clamor of men,
Slaves of emotion, mad with the race,
Making Rome's frenzy rampant again,
Turning down thumbs on Time and on Space;
Throngs such as Spartacus battled before,
Mingling their shouts with the motors loud roar.

sprinter who holds the world's record of 9 2-5 seconds for the 100 yards dash, would make a very poor showing indeed in a contest with the Fiat which, at a speed of 142.9 miles per hour, would cover the century in 1.52 seconds. The champion mile runner, W. G. George of England, with a mark of 4 minutes 12¾ seconds, would be an even more hopeless contender as his average speed is but 14.2 miles per hour.

Now for a literary shot of hop, a drug fiend's dream of speed and the victory of a blur in the 500-mile race. Quick, Watson, the needle!

Duray at the Speedway

Arthur Duray is at the tape, not in the diminutive Peugeot that he will drive Saturday but at the wheel of the greatest of space-conquerors, the 300-horsepower Fiat. A bomb breaks! The crowd is on its feet. With motors roaring and exhausts popping, the cars are sent away. The Fiat leaps to the front. Duray sweeps around the

tortuous turns without diminishing his speed, at the same furious death-inviting clip as when he established the world's record of 142.9 miles per hour in his trial at Ostend.

As he whirls around the resonant red bowl, he is but a streak, a flash. Not once does he stop either for fuel or new tires. His time for each of the 2½ mile laps is 1 minute 3 seconds. The race started at 10 o'clock. He gets the checkered flag just as the hands of your watch are about to point to half past one. He has covered the 5 centuries in 3 hours, 29 minutes, 52.8 seconds. At this time in 1912, Dawson, in his National, would have traveled only 275 of the 500 miles.

Champions of the motor car need not depend alone on Duray's Fiat to defend the speed title against all comers. There are other gasoline-driven monsters of steel almost as fast and which have established sensational records in competition and sustained flight, cars that have crowded 100 or more miles within a floating hour and more than ten times 100 miles within 12 hours.

There is the mighty twelve-cylinder Sunbeam that ground Time beneath its wheels on the Brooklands speedway twice within a week last October. In its premier appearance, it averaged 110.75 miles per hour and defeated eleven other contestants in an 8.5-mile handicap race. This record is all the more remarkable in that it was made in competition and in a handicap event. Starting from scratch, Chassagne, the Sunbeam driver, was forced to thread his way through a closely bunched field. No doubt, on a clear track, the average speed would have been much greater. For a single circuit of the 2.75-mile course, the Sunbeam averaged 118.58 miles per hour which for the longer distance is almost as creditable as the 142.9 miles per hour average of Duray in driving the kilometer.

Sunbeam's Hour Record

Six days after this triumphant debut, the English speed creation was sent away to shatter the 1-hour record of 106 miles 387 yards established by Goux and the Peugeot at Brooklands in April. Holding to an average lap time of 1 minute 32 seconds in order to save tires and breaking the 50 and 100-mile marks en route, Chassagne, at the expiration of 60 minutes, had covered 107 miles 1,672 yards, which still stands as record.

John Bull has another formidable defender of the motor car's speed laurels in the six-cylinder Sunbeam that averaged 89.91 miles an hour in establishing the 12-hour record of 1.078 miles, 460 yards. This performance eclipsed the best previous mark, that of the Hornstead-Scott Argyle, by approximately 164 miles. The Sunbeam is the first car to crowd 1,000 or more miles within 12 hours. What is could do if it went after the 24-hour record is problematical, but in all probability it easily could beat Edge's mark.

Mighty is the motor car! It is the personification of speed.

Resurgent



Speed gladiators, greasy and grim,
Sweaty in labor, crazed by desire,
Flirting with chance on the red saucer's rim,
Staking their lives on bolt and on tire;
Bidding defiance to projectile laws,
Jeering at Danger, mechanical flaws.

Briton and Teuton, Yankee and Gaul,
Seeking world's laurels, suitors of Fame,
Fettering Distance to make it a thrall,
A tyrant dethroned, servile from shame;
Knights of Velocity, challenging Fate,
Mighty in triumph; when humbled, as great.

The Fourth Annual Sweepstakes



By C. G. Sinsabaugh

THE 500-mile race at Indianapolis has done more than any other event to establish motoring as a major sport, for there is no other sporting event in the world that can show such a large paid attendance at so high a rate per capita. Even baseball and football cannot bring out such crowds, the closest rival being soccer football in England, which perhaps may show more people but not so large a gate.

Last year 85,000 paid admissions were recorded and it looks as if the 1914 race will show an increase of at least 30 per cent. The management has anticipated this by building new stands which will seat 10,000 more than last year. Still more surprising is the fact that the majority of the spectators come from other cities. Chicago is credited with being the strongest supporter of the race outside of Indianapolis and it is estimated that at least 10,000 Chicagoans attend the event, of which number probably half drive there in their own cars. When you figure that it must cost each visitor at least \$50 for this 1-day outing, then you can arrive at a fair estimate of what the American public annually spends on this classic.

Importance of 1914 Race

There can be no doubt of the 1914 race being the greatest motoring event ever contested in the world. Not even in the earlier Vanderbilts was foreign represen-

The Entry List Before Eliminating Trials

No.	Car	Driver
1	Burman	Burman
2	Stutz	Cooper
3	Stutz	Oldfield
4	Gray Fox	Wilcox
5	Beaver Bullet	Keene
6	Peugeot	Goux
7	Peugeot	Bollot
8	Maxwell	Tetzlaff
9	Excelsior	Christiaens
10	Delage	Guyot
12	Sunbeam	Chassagne
13	Mason	Mason
14	Peugeot	Duray
15	King	Klein
16	Delage	Thomas
17	Burman	Disbrow
18	Mercedes	De Palma
19	Mercedes	Wishart
21	Mercedes	Bragg
22	Mercedes	Pullen
23	Mercedes Special	Mulford
24	Stutz	Anderson
25	Maxwell	Carlson
26	Marmon	Dawson
27	Sunbeam	Grant
28	Stafford	Callahan
29	Metropol	Horan
31	Keeton	Knipper
32	Maxwell	
33	Texas	Clark
34	Bugatti	Friedrich
35	Great Western	Jenkins
36	Great Western	Price
37	Great Western	Radina
38	Bull Dog	Chandler
39	Pope Bullet	Roberts
41	Washington	Stringer
42	Duesenberg	Rickenbacher
43	Duesenberg	Haupt
45	Tatter	Mazzucco
46	Rayfield	Hughes
47	Titze	Melaun
48	Ray	Brock
49	Isotta	Gilhooley
51	Shambaugh	Shambaugh

SOUTH TURN SHOWING THE NEW STAND OF BOX SEATS

Opposed to them as such American manufacturers as Stutz, Mercer, Maxwell, Great Western and one or two others, while the remainder of the field is made up of special cars either built or rebuilt by drivers who see a chance to pull down big money.

And the big money is there. The speedway management has hung up a purse of \$50,000, divided as follows: \$20,000 for first; \$10,000 for second; \$5,000 for third; \$3,500 for fourth; \$3,000 for fifth; \$2,200 for sixth; \$1,800 for seventh; \$1,600 for eighth; \$1,500 for ninth, and \$1,400 for tenth.

The Accessory Prizes

In addition to this the manufacturers of accessories have come forward more liberally than ever before, their offerings amounting to \$17,375, while in addition there are trophies valued at \$18,750. Summing them all up, one finds that the race represents \$86,225. The winner should pick up close to \$30,000 as a result of about 6 hours and 30 minutes of driving.

The trophies hung up include the famous Wheeler & Schebler cup, valued at \$10,000, which goes to the leader at 400 miles; the Prest-O-Lite trophy, worth \$2,750, for the leader at 300 miles; the Remy trophy and brassard, worth \$2,500, for the leader at 200 miles; the \$2,000 Rayfield trophy for the winner, provided he uses a Rayfield carburetor, and the \$1,500 G & J

tation so strong as in this year's sweepstakes. Of the forty-five cars entered twelve are of European make. Of this number eight are driven by foreign drivers, sent over by their respective factories to battle for the American gold.

trophy for the leading driver at 100 miles.

The accessory offerings represent a variety of interests, thirteen different concerns being on this list. The liberality of this section of the trade has led to an innovation which will protect its interests. The majority of these prizes have been turned over to the contest board of the American Automobile Association, which will certify whether or not the conditions have been met. The list of accessory prizes, depending of course on the

first, \$100 for second, \$100 for the third driver. Champion Spark Plug Co., spark plugs—\$500 for first, \$250 for second, \$125 for third, \$75 for fourth, \$50 for fifth. Janney-Steinmetz Co., tanks—\$75 for first, \$50 for second, \$25 for third.

In addition there are four other accessory prizes of a somewhat different nature. The Firestone company is giving a bonus of \$3,000 for winning the race on Firestone tires, with \$1,000 for second. The Rayfield carburetor people also hang up \$100 for the eliminating trials, the money being awarded in case a Rayfield-equipped

this race than it did to put on last year's. There have been several most important additions made to the plant for one thing. On the south turn there has been erected a new stand, made up entirely of boxes. Another huge stand has been built at the extreme north end of the group of grandstands lining the homestretch.

In addition it has been found necessary to greatly enlarge the press stand. Even last year with all the room provided there was great congestion here, so this time



NEW PRESS STAND WITH PORCH ADDED

DIRT BANK ON INSIDE ON SOUTH END OF TRACK

use of the accessory manufactured by each concern, is as follows:

Wheeler & Schebler, carburetor manufacturers—\$1,000 for first, \$300 for second, \$200 for third, \$100 for fourth.

Longuemair Co., carburetor manufacturer—\$1,000 for first, \$400 for second, \$200 for third.

Findelsen & Kropf Mfg. Co., maker of Rayfield carburetors—\$1,000 for first, \$300 for second, \$200 for third.

J-B Co., carburetor manufacturer—\$1,000 for first, \$300 for second, \$200 for third.

Bosch Co., magnetos—\$500 for first, \$300 for second, \$200 for third.

Remy Co., magnetos—\$1,000 for first.

Standard Rubber Bearing Co., Rudge-Whitworth wire wheels—\$500 for first, \$250 for second, \$125 for third.

Grossman Co., Red Head spark plugs—\$500 for first, \$250 for second, \$100 for third.

Hartford Suspension Co., Truffault-Hartford shock absorbers—\$250 for first, \$150 for second, \$100 for third.

Clarence N. Peacock & Co., Ames equalizing spring—\$250 for first, \$150 for second, \$100 for third.

Bosch Co., spark plugs—\$100 for

car makes the fastest time in these trials. In addition the Waltham Watch Co. offers a \$500 watch, the finest it makes, for the driver finishing first, second or third, who stops the least time at the pits. It is styled the Waltham efficiency prize. The Bosch company also offers \$500 if Dawson's 500-mile race is broken by the winner and Bosch equipment is used.

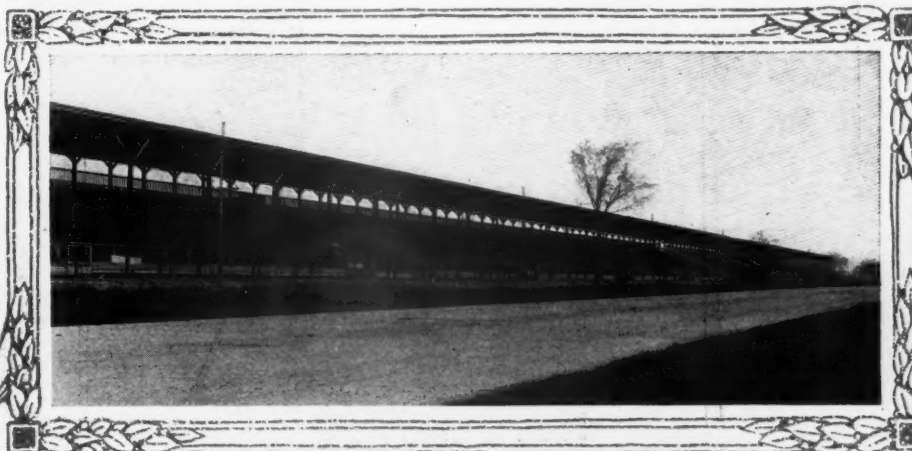
The speedway management estimates that it will cost \$15,000 more to stage

the management has made more room by building a sort of a porch to the south where will be located those newspaper men who are not actively engaged in reporting the race.

Considerable work also has been done on the track. For instance, a new section of brick has been put in high up on the bank as one enters the south turn. Last year there was a bump there—slight in itself but almost a mountain when a car traveling at 80 miles an hour hit it.

A new tunnel has been put in on the south turn, eliminating the old bridge that formerly was used to reach the infield. This leaves only one bridge—in the homestretch—but that is to be done away with another year, for the drivers say that it is like plunging into a tunnel to go under it at speed. Still another improvement is the placing of dirt banks on the inside of the track. One bank is located at the

farther side of the south turn and the other is on the last turn going into the homestretch. The dirt bank is intended to stop cars running on the track from plunging into the infield.



ONE OF THE NEW STANDS—THE NEW \$1 SEATS

Leading Candidates



for Sweepstakes Honors

CHASSAGNE



BOILLOT



GUYOT



FRIEDRICH



THOMAS



LURAY



CHRISTIAENS



JENKINS



EDSPOW



ROBERTS



CHANDLER



ROXEND

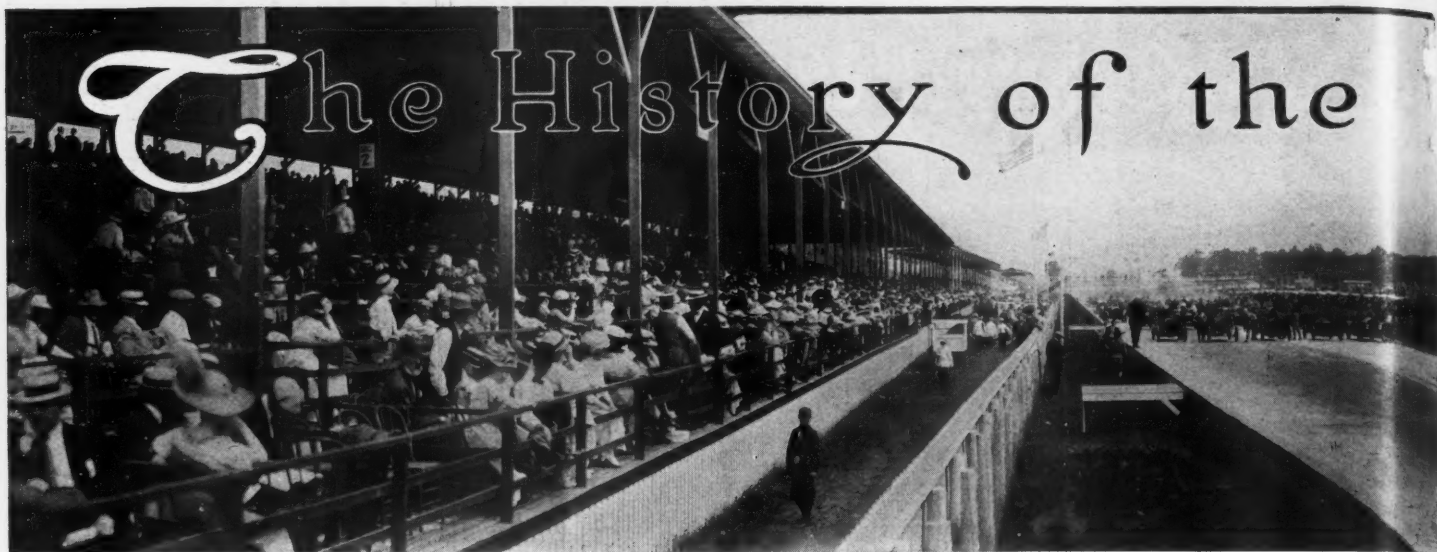


KLEIN



HORAN





START OF THE FIRST 500-MILE INTERNATIONAL SWEEPSTAKES RUN

Among the noisy thousands that will pack the gray stands of the Indianapolis motor speedway Saturday, there will be one inconspicuous patriarch, one silent and nonchalant figure who will yawn and stretch all through the thrill-choked day and murmur over and again to himself "Old stuff" as the cars roar by in monotonous and death-defying flight.

You may not be able to find him without a search warrant. One minute he will be waiting for something ominous to happen on an oil-soaked embankment; the next, lounging near some pit where driver, mechanic and helpers, grimy and toiling, are cursing the loss of seconds; then you may see him on the glaring red straightway where two contenders for a fortune are racing for the lead. He will be here, there, everywhere—for he is a privileged character and passes cautious officials and khaki-clad guardsmen without being challenged.

Provided you are able to interrupt his ceaseless perambulations and can force him to submit to an interview, he will relate some reminiscences that will make you forget that Boillot is leading dePalma by 27 seconds—if he is—and that Duray has stopped on the fifty-first lap to change a right rear—if he has.

This old man of the speedway measures his experiences by centuries, not years. Five hundred years before the dawn of the Christian era, he stood on the sacred plains of Olympus, among the temples and statues of the gods and the treasure houses of the Greeks, and watched the lithe-limbed youths of Sparta, Athens, Thebes and Corinth run, wrestle, box and throw the discus for priceless laurel wreaths and the favor of the attending but unseen divinities.

During the reign of the profligate Cæsars, he mingled with the throngs in the circus maximus of Rome. He saw the sword of Spartacus crash through the steel helmet and skull of a fellow gladiator of Capua; saw Ben Hur and his Arabian steeds emerge from the dense dust of the amphitheater victors in the chariot race; saw the giant Ursus throw the

IN the race of 1911, the first 500-mile contest held on the speedway and featured by the closest finish in the annals of the three classics, Ralph Mulford learned the exact value of a second. In his days as a school boy he had scrawled in his copybook "Seconds are precious," but just how precious he never knew until that Memorial Day afternoon of 3 years ago. Then each second was worth to him just \$48.54½ in the coin of the realm.

Harroun's Eye-lash Victory

Ray Harroun, the winner, flashed across the wire in the Marmon only 4 minutes 43 seconds before Starter Wagner flected the hood of Mulford's Lozier with the checkered flag. On corrected time, however, Harroun's lead was reduced to 1 minute and 43 seconds. Less time than it takes the second hand of your watch to make two revolutions, one eight hundred and thirty-ninths of a fleeting day, cost Mulford the victory and deducted \$5,000 from his winnings. In the history of motor car racing in America, there is but one triumph by a narrower margin and that was the victory of David

Bruce-Brown in the American grand prize of 1910, when he defeated Hemery by 1.42 seconds in the most spectacular finish of all time.

Where were those precious seconds lost in the 500-mile race of 1911? Probably at the pit, for Mulford was the prey of the blowout jinx all during the contest and

changed no fewer than fourteen tires before he completed his exasperating 5-century flight while Harroun stopped for new rubber but three times. Defeat changed Mulford's perpetual smile to a temporary frown on the hundred and ninety-third lap, when the

STATISTICS OF THE 1912 INDIANAPOLIS 500-MILE RACE

Open to cars with a piston displacement of 600 cubic inches or under.

Position	No.	Car	Driver	Cyl.	Bore	Stroke	Piston Displace	Time	M.P.H.
1	32	Marmon	Harroun	6	4 1/4	6	477.1	6:42:08	74.59
2	33	Lozier	Mulford	4	5 5/8	6	544.6	6:43:51	74.29
3	28	Fiat	Bruce-Brown	4	5	7 1/2	589.0	6:52:29	72.73
4	11	Mercedes	Wishart	4	5.1	7.1	580.2	6:52:57	72.65
5	31	Marmon	Dawson	4	4.5	7	445.3	6:54:34	72.34
6	2	Simplex	De Palma	4	5 3/4	5 3/4	597.2	7:02:02	71.13
7	20	National	Merz	4	5 3/4	5 1/4	436.8	7:06:20	70.37
8	12	Amplex	Turner	4	5 1/4	5	443.3	7:15:56	68.82
9	15	Knox	Belcher	6	5	4 3/4	559.1	7:17:09	68.62
10	25	Jackson	Cobe	4	5	5 1/2	431.9	7:21:50	67.90
11	10	Stutz	Anderson	4	4 3/4	5 1/2	389.9	7:22:55	67.73
12	36	Mercer	Hughes	4	4 3/4	5	300.7	7:23:32	67.62

Running at the finish, Firestone, Frayer; National, Wilcox; Mercer, Bigelow; Inter-State, H. Endicott; Velle, Hall; Benz, Knipper; Benz, Burman; Simplex, Beardsley; Flat, Hearne-Parker; Pope-Hartford, Fox; Cutting, Delaney; Jackson, Tower; McFarlan, Marquette; Cole, W. Endicott.

Also started—National, Altken, 125 laps; Case, Jones, 122; Case, Strang, 109; Apperson, Lytle, 82; Alco, Grant, 51; Buick, C. Basle, 46; Pope-Hartford, Disbrow, 45; Buick, A. Chevrolet, 30; Fiat, Bragg, 24; Jackson, Ellis, 22; Lozier, Tetzlaff, 20; Amplex, Greiner, 12.

Entered but did not start—Fal, Pearce; Fal, Gelnaw; and Lozier, Van Gorder, scratched. McFarlan, Clemens; Velle, Gibbon; and Cole, Jenkins, failed to qualify.

Indianapolis Sweepstakes



AT INDIANAPOLIS MAY 30, 1911, AND WON BY HARROUN IN A MARMON

maddened bull; saw the blood of Christian martyrs stain red the floors of the lion's cage. He stood at the side of Nero, saw the Emperor turn down his fat thumbs, touched his purple toga.

When Richard the Lion Hearted sat upon the throne of England, he watched Ivanhoe ride out upon the field of honor; saw lances shivered and knights unhorsed in the tournaments of the middle ages; heard the despairing shrieks or exultant cries of fair ladies as they beheld the overthrow or victory of their champions.

In the gay arenas of Seville and Madrid, he has viewed the polychromatic processions of brightly caparisoned picadors and matadors; beheld the goring of horses and the death quivers of a defeated bull; saw the cheeks of a Carmen flush with pride and passion as she kissed the lips of her triumphant Don Juan.

Old stuff! Of course all this strife, this clamor, this crowd, this excitement is old stuff to him, but without him the 500-mile race would be only a scientific test of the stamina of mechanism and the skill of man. He is Spectacle. His presence at the speedway is imperative. In color and thrills, the richest of all speed classics ranks with the Olympic games of Greece, the gladiatorial combats of Rome, the knightly jousts of medieval England and the bull fights of Spain. He has made it so.

The 500-mile race is more than a contest. It is a pageant of motion, a spectacle of action, a fete of frenzy and a melodrama of speed. It is color, excitement, uncertainty, despair and triumph crowded into 7 hours of a red May day. It has its heroes, crowned and uncrowned,—drivers who are as great in defeat as others are in victory. It abounds in what the writer calls features, what the artist terms high lights. To prove the truth of such assertions, we have only to beat back on the trail of memory 3 years and view in retrospect the Homeric struggles of 1911, 1912 and 1913.

Lozier driver was chasing Harroun like a madman in an attempt to overtake and pass the flying Bedouin in the seven more circuits of the track that each had to make. In this crisis, Mulford rolled up to his pit on three castings and the straightening of a rim and the putting on of a tire cost him 2½ minutes, a loss that never was regained although Smiling

Ralph again took up the pursuit in the vain hope that Harroun might be forced to stop before the end.

The hero, the victor, the whirling dervish of this race, Harroun, drove neither sensationally nor spectacularly. Riding without a mechanician, he made of the contest a cold business proposition. He was more cautious than daring. He merely decided on a pace and maintained it religiously. Instead of rushing to the front

at the very start, he was content to lay back in the ruck and await his opportunity. His seeming phlegmatism was almost nerve-racking to the crowds in the stands, to whom the Marmon looked like a huge yellow wasp crawling about the rim of a huge red saucer.

Patschke Goes to the Front

Some of the credit for the Marmon victory—how much still is a matter of dispute—justly belongs to Cyrus Patschke. Patschke drove only 100 miles of the race, but made the most of his opportunity. Relieving Harroun at the completion of the sixty-fourth lap, he stepped upon the throttle of the Marmon and gave relentless chase to Bruce-Brown in the pace-making Fiat. Impetuous where Harroun was cautious, Patschke overtook the Italian speed creation and shot to the front, taking a lead that Harroun never surrendered when he again took the wheel of the yellow car.

The 1911 race was the only one of the three marked by a fatal accident. Samuel Dickson, mechanic for Arthur Greiner, met death early in the contest when the Am-

STATISTICS OF THE 1911 INDIANAPOLIS 500-MILE RACE

Open to cars with a piston displacement of 600 cubic inches or under.

Position	No.	Car	Driver	Cyl.	Bore	Stroke	Piston displacement	Time	M.P.H.
1	8	National	Dawson	4	5 1/2	6 1/4	490.8	6:21:06	78.7
2	3	Fiat	Tetzlaff	4	5 1/2	7 1/2	589.0	6:39:25	76.6
3	21	Mercer	Hughes	4	4 3/4	5 1/2	300.7	6:33:09	76.3
4	20	Stutz	Merz	4	4 3/4	5 1/2	389.9	6:34:40	76.0
5	18	Schacht	W. Endicott	4	4 3/4	5 1/2	389.9	6:46:28	73.3
6	2	Stutz	Zengel	4	4 3/4	5 1/2	389.9	6:48:31	73.2
7	14	White	Jenkins	6	4 1/4	5 3/4	489.4	6:52:38	72.7
8	22	Lozier	Horan	4	5 3/4	6	544.6	6:59:38	71.4
9	9	National	Wilcox	4	5	7 1/2	589.0	7:11:30	69.6
10	19	Knox	Mulford	6	4 3/4	5 1/2	597.16	8:53:00	56.2

Also started—Mercedes, De Palma, 198 laps; Cutting, Burman, 156; Mercedes, Wishart, 92; Simplex, Dingley, 155; Lozier, Matson, 107; Stutz, Anderson, 79; Marquette, Leisaw, 63; Case, Hearne, 54; Firestone, Rickenbacker, 44; National, Bruce-Brown, 25; Lexington, Knight, 7; Opel, Ormsby, 5.

Entered but did not start—Mason, Oldfield; Shambaugh, Shambaugh; and Continental, unnamed, failed to qualify.



plex threw a rim and tire on the back stretch and turned turtle. Among the drivers, the Amplex was regarded as the hoodoo car. In practise, it had ran wild and crashed into a concrete wall, breaking Joe Horan's leg.

Another accident, not as serious but one that sent a greater thrill through the spectators, occurred in the home stretch and rendered one driver and two mechanics hors du combat. Jagersberger, in the Case, was running slowly in the middle of the track opposite his pit, coming in to repair a broken steering knuckle. In jumping out of the disabled car, Anderson, Jagersberger's machanician, slipped, fell and was run over by his own car. Harry Knight, leading a field of three cars fighting for the advantage at the turn, came thundering past the stands and saw the Case helper lying directly in his path. Knight threw on his brakes. His car turned half way round and crashed into an Apperson that was standing at the pits. Knight and his mechanic were thrown from the machine and bruised, while the Apperson crew miraculously escaped injury. Knight either thought quickly and took a long chance with death to save Anderson's life or lost his head in the crisis. That, like the amount of credit belonging to Patschke for the Marmon triumph, still is a matter of dispute.

Dawson's Victory Overshadowed

With the lapse of a year, came the second annual 500-mile race, the speed thrill perennial and a bloodless tragedy—a tragedy of defeat that overshadowed the victory of the persistent Dawson and his blue National that averaged 78.7 miles per hour in its journey of unexpected triumph.

As the crushing of Napoleon eclipsed the history-making attack of Wellington at Waterloo, so the downfall of de Palma eclipsed the conquest of Dawson.

No race ever had a more spectacular climax than the international sweepstakes of 1912. At 10 o'clock in the morning, twenty-four cars, the speed creations of the master engineering minds of America and Europe, were sent away in the dense smoke of their popping exhausts. At the steering wheels of these steel monsters sat the greatest of all American racing drivers, mad Mullahs who defy the fates and court death to win fame and fortune, flying Mercuries of stout heart and taut nerves.

Of the four and twenty contenders that rumbled and roared a strident challenge at 10 o'clock in the morning, only ten were

on the track at 4 o'clock in the afternoon. It had been a day of minor disaster. Fourteen drivers had been forced to admit defeat before the climax of the day's sport dawned. Of the fated fourteen, three had been tossed from their seats and bruised when their cars plunged from the track and somersaulted to destruction. The wrecks lay on the rim of the colossal oval, twisted, broken and foreboding. The others had docked disabled mechanisms at the white pits, cursing broken rods, weak bolts and faulty engines.

The Psychological Moment

One hundred and fifty thousand speed fanatics were awaiting the final thrill. The ten survivors were driving like men who had lost their senses. It was the psychological moment in a waning race that had been a heart-breaking chase since

STATISTICS OF THE 1913 INDIANAPOLIS 500-MILE RACE

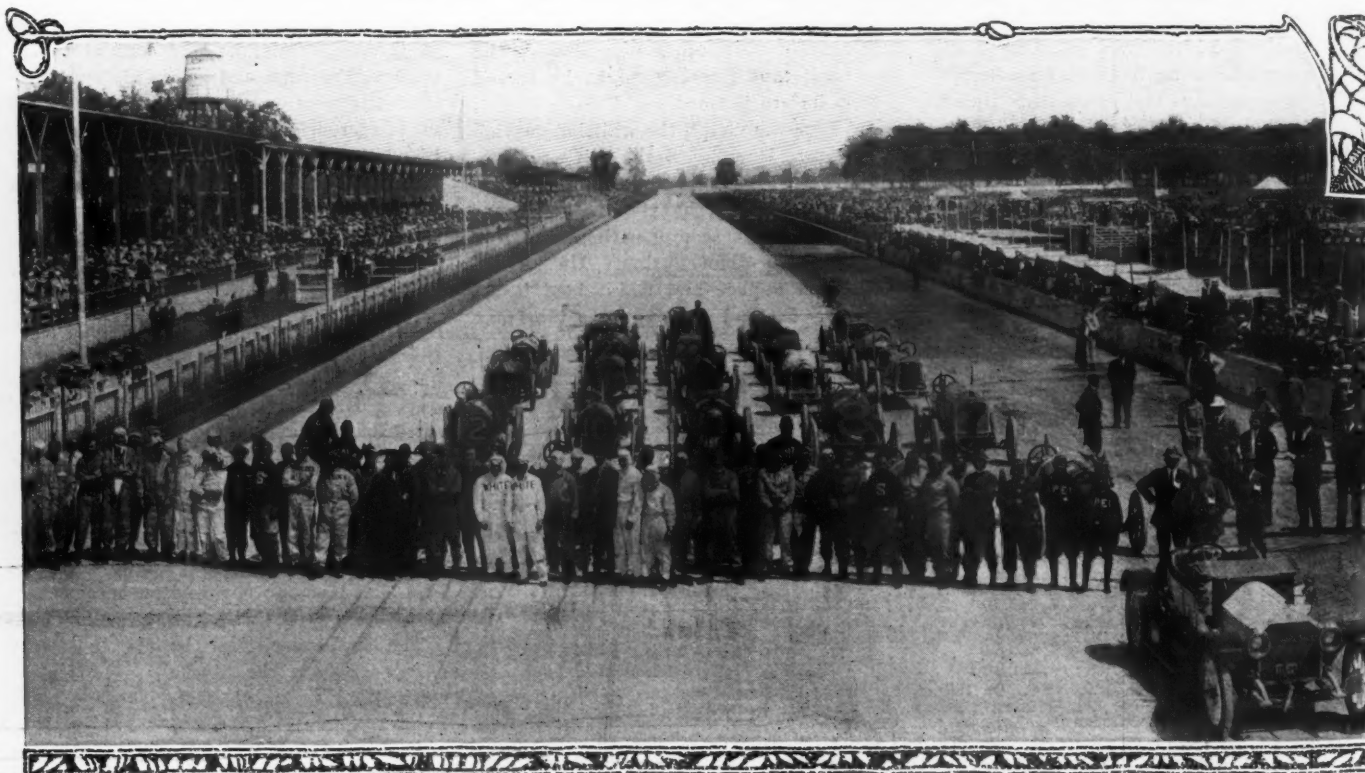
Open to cars with a piston displacement of 450 cubic inches or under.

Position	No.	Car	Driver	Cyl.	Bore	Stroke	Piston displ.	Time	M.P.H.
1	16	Peugeot	Goux	4	4.256	7.875	448.13	6:35:05:00	75.92
2	22	Mercer	Wishart	4	4.370	5.000	299.00	6:48:13:40	73.49
3	2	Stutz	Merz	4	4.813	5.500	399.97	6:48:49:25	73.38
4	9	Sunbeam	Guyot	6	3.540	6.290	367.52	7:02:58:95	70.92
5	23	Mercedes-Knight	Pilette	4	3.937	5.118	251.33	7:20:13:00	68.14
6	12	Gray Fox	Wilcox	4	4.750	5.500	389.90	7:23:26:55	67.65
7	29	Mercedes	Mulford	4	4.489	7.087	448.66	7:28:05:50	66.95
8	31	Case	Disbrow	4	5.100	5.500	449.00	7:29:09:00	63.08
9	35	Mason	Haupt	4	4.316	6.000	350.50	7:52:35:10	63.47
10	25	Tulsa	Clark	4	4.752	5.500	340.10	7:56:14:25	62.90

Running at the finish—Keeton, Burman.

Also started—Stutz, Anderson, 187 laps; Mason, Evans, 158; Anel, Liesaw, 148; Mercer, Bragg, 128; Henderson, Knipper, 125; Isotta, Tetzlaff, 118; Case, Nikrent, 67; Mason, Tower, 51; Isotta, Trucco, 39; Nyberg, Endicott, 23; Peugeot, Zuccarelli, 18; Mercer, De Palma, 15; Isotta, Grant, 14; Schacht, Jenkins, 13; Stutz, Herr, 7; Case, Endicott, 1.

Entered but did not start—Smada, Adams; Deltal, Dawson; and Pennebaker. Pennebaker, scratched. Shambaugh, disqualified for infraction of A. A. A. rules.



LINE-UP FOR START OF 1912 RACE, WON BY DAWSON IN A NATIONAL

noon, a day of seemingly futile and wasted effort.

The spectators were a trifle disappointed. The victory of Ralph de Palma in the gray Mercedes seemed inevitable. The throngs, insatiate in their desire for a hood-to-hood finish, grudgingly conceded a triumph to the lion-hearted Italian who, averaging better than 80 miles an hour for 490 of the 500 miles, had a lead of three laps over his most dangerous competitor, Joe Dawson, the "kid," who was urging on his blue National to the very limit of its speed.

Mercedes Stops on Back Stretch

But de Palma was not destined to be a winner. With only three more laps to go, with victory almost in the Italian's grimy hand, the hood of the Mercedes became a Pandora's box. The gray car, hitting on but two of the four cylinders and its shame hidden in the smoke of its exhaust, suddenly came to a dead stop on the back stretch. De Palma and his mechanic, Rupert, Jeffkins, lept from their seats, frantically tugged at the bonnet straps and started working on the balky motor.

The blue National again roared by the stands, with Teddy Tetzlaff in the red Fiat, and Hughie Hughes at the wheel of the yellow Mercer, trailing the determined Dawson.

"Where is de Palma?" was the cry of the crowds. If you were there you asked the same question as Dawson flashed by for a second, a third, a fourth time. Had the earth suddenly opened up and swallowed the Italian or had he shot off into space? Such a disappearance as his could only be attributed to a miracle.

Seconds slipped into eternity and still no Mercedes. The National was eating up

ground and at every revolution of its wheels, victory came nearer. Finally Starter Wagner darted across the track and waved the green flag at the onrushing Dawson. Then a gray blur showed far down the home stretch. It was de Palma. He was pushing his crippled car in. His engine had played him false. He had lost a race that 10 minutes before was conceded to be his without a question. He stood to win \$30,000 in prize money. He received not a single penny for his labor and daring. Even the sensational records that he had established were denied him because he had failed to finish.

Wearily de Palma rolled his crippled car across the wire as the checkered flag dropped for Dawson. The Italian's face was dripping with perspiration. He raised his head and smiled at the thousands who were cheering a game loser and a popular winner. He looked at his car and then walked over to the National pits to extend his hand to a grinning victor. What a finale for a speed drama!

France to the Fore

Last year's race had no such tragedy. From the viewpoint of the American sportsman, the 1913 classic was a national speed calamity. In the short space of 6½ hours, France regained laurels which her former champions lost to George Robertson, Harry Grant and David Bruce-Brown in the early struggles for the Vanderbilt cup and grand prize. "The real, live nephews of my Uncle Sam"—to quote George M. Co-han's sonnets of patriotism—saw Jules Goux and the Peugeot shake off the challenge of the Mercer and Stutz and roll arrogantly across the wire, crushing the last despairing hope of an American victory

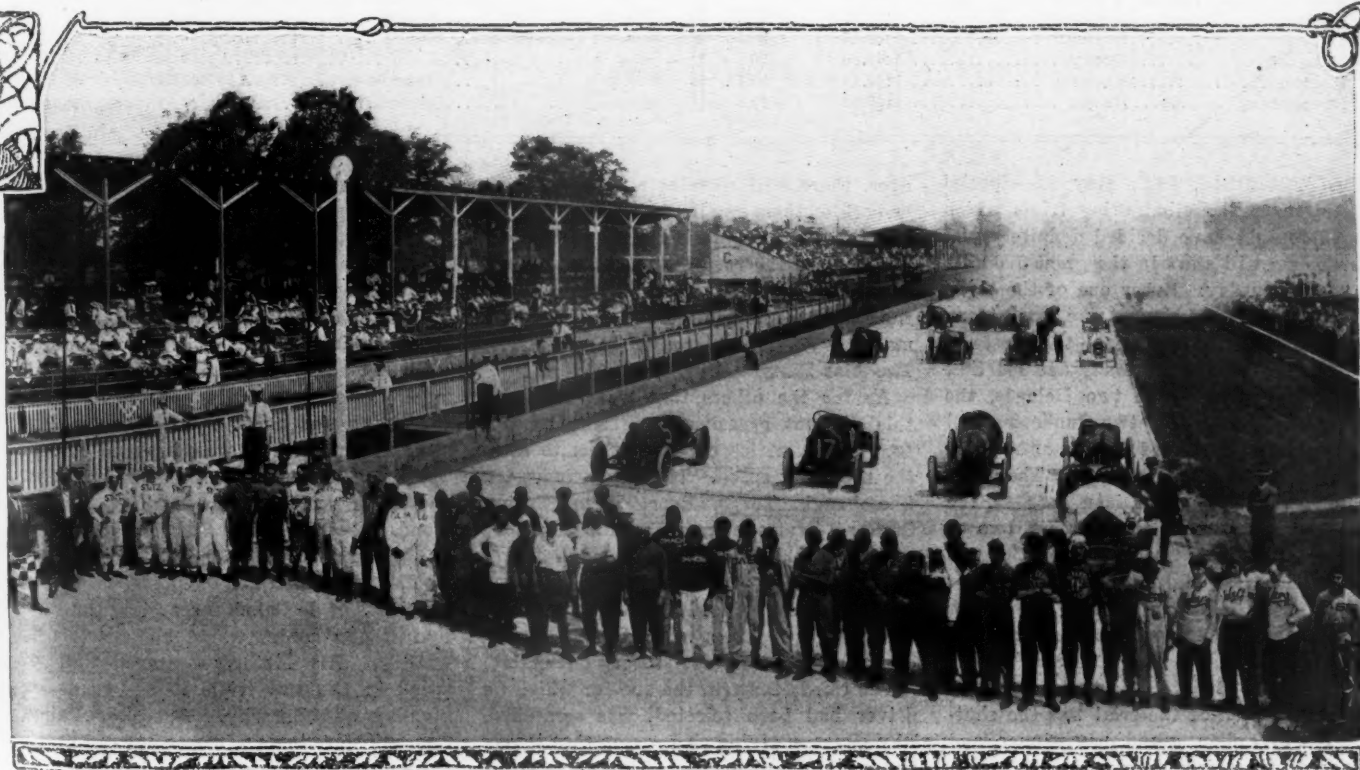
as the brakes were applied. There was but one consolation for the throngs in the stands—Dawson's record of 78.7 miles an hour was not equalled by the conquering Parisian, who averaged 75.92 miles an hour.

Foreigners Compete for First Time

The international sweepstakes of 1913 was all that the name implied. For the first time in the history of the Indianapolis classic, Europe sent over a troupe of its stars and a flotilla of its speed creations to challenge the prestige of the American driver and the American car. When the bomb which sent a roaring monsoon of steel away to sweep time and space before it sounded, five challengers from the old world thundered a deft to America's defenders—two French Peugeots, driven by Goux and Zuccarelli; an English Sunbeam, with Guyot at the wheel; a Mercedes-Knight, tooled by a Belgian sportsman, Theodore Pilette, and an Italian Isotta, in charge of Vincenzo Trucco.

There was nothing spectacular about Goux' victory. Like Harroun in 1911, the Parisian, when once out in front, never was headed. He drove cautiously and calmly even when Burman and the green Keeton were barking at his heels and Earl Cooper, acting as relief for Gil Anderson, was cutting down the Peugeot lead from two and one-half laps to 4½ minutes in the 27 minutes he was entrusted with the Stutz.

The pursuers furnished the thrills in 1913. Charles Merz, driver of the No. 2 Stutz, disobeyed orders and gave to the race a pyrotechnic finale. He won \$5,000 by his daring. Running in fourth place at the completion of the one hundred and



LINE-UP FOR START OF 1913 RACE, WON BY GOUX IN A PEUGEOT

eightieth lap, he moved up automatically to third position when his teammate, Anderson, was forced to retire because of a broken camshaft. For over 100 miles he had been driving desperately, refusing to give a second.

Gradually gaining inches when miles were needed to overtake Goux and Wishart, who was trailing the Peugeot in the Mercer, Merz was given the green flag after the latter's car had started on its final lap. As he crossed the wire the front of his machine was aflame and the Stutz pitmen waved him in. Merz saw the frantic signals but did not heed them. In a veritable chariot of fire, he drove the last 2½ miles with Martin, his mechanic, lying across the hood and beating at the flames with his bare hands. There is something to admire in men like Merz and Martin, men who never quit.

There were few spectators in the cheer-

ing stands who knew who Stevens was at the start of the 1913 race. He was an unknown, a faithful, never-quit boy who rode beside Ralph Mulford in the Mercedes. It was Stevens' first 500-mile race, but he was equal to the ordeal, more than equal as he proved near the close of the struggle.

Laying back at the start, Mulford gradually bettered his position as he reeled off lap after lap and at the end of 250 miles was in third place. He had not made a stop at the pits and his motor was sounding a menacing challenge. After running 275 miles without taking on fuel and breaking all records for nonstop competition, Mulford was the victim of that "unexpected something" that always happens in a motor car race.

With third place practically clinched and many predicting that he would pass the Peugeot eventually, Mulford ran out of gasoline on the back stretch. Leaping

from the exhausted Mercedes, Stevens started for the pits, more than a mile away. Seconds are precious in a race for \$50,000. Stevens may have been a tyro, but he knew that. Darting through the crowds in the infield, stumbling and falling in the high grass and weeds, jumping fences and creeks of sluggish water, he raced to the pits, staggering over the pit rail so as not to be disqualified, cried, "Ralph's out of gas," and fell in a faint. A fresh mechanic carried enough gasoline to Mulford to permit him to get to the pits to fill his tank and the old Mercedes continued the race, getting seventh place, where second might have been Mulford's had it not been for his running out of fuel.

Such heroes as Merz, Martin and Stevens share the honors of the day with the victor of the 500-mile race, the world's greatest speed spectacle.

Trials Reduce Indianapolis Field to Thirty Cars

Boillot in Peugeot Averages 99.85 m. p. h.—Tetzlaff in Maxwell Fastest of Americans—All Foreign Drivers in Qualifying List—Pullen in Mercer Shut Out

HERE ARE THE THIRTY CARS THAT QUALIFIED

Car	Driver	Time	Miles Per Hour	Car	Driver	Time	Miles Per Hour
Peugeot	Boillot	1:30.13	99.85	Delage	Guyot	1:40.95	89.1
Peugeot	Goux	1:31.71	98	Sunbeam	Chassagne	1:41.91	88.25
Maxwell	Tetzlaff	1:33.40	96.75	Mercedes Special	Mulford	1:42.03	88.25
Delage	Thomas	1:35.20	94.75	Duesenberg	Rickenbacher	1:42.11	88.10
Marmon	Dawson	1:36.20	94	Mercedes	De Palma	1:42.12	88.10
Maxwell	Carlson	1:36.60	93.5	Stutz	Cooper	1:42.25	87.9
Mercer	Bragg	1:36.80	93.25	Ray	Brock	1:42.47	87.75
Mercer	Wishart	1:37.10	92.25	Bugatti	Friedrich	1:42.59	87.65
Excelsior	Christians	1:38.67	91.5	Braender Bulldog	Chandler	1:42.81	87.5
Gray Fox	Wilcox	1:39.16	91.1	Stutz	Oldfield	1:43.15	87.1
Stutz	Anderson	1:39.46	90.75	Mason	Mason	1:43.22	87
Burman	Burman	1:39.55	90.55	Beaver Bullet	Keene	1:43.60	86.75
Peugeot	Duray	1:40.00	90	King	Klein	1:43.60	86.75
Keeton	Knipper	1:40.48	89.75	Burman	Disbrow	1:43.76	86.7
Duesenberg	Haupt	1:40.68	89.5	Sunbeam	Grant	1:44.04	86.40

INDIANAPOLIS, Ind., May 27—Special telegram—The eliminating trials which ended tonight have decided definitely just which cars will start in the great 500-mile race on Saturday. Every one of the eight foreign drivers gets in but one foreign car figures among the also rans—the Isotta.

The qualifying trials today decided that all three Peugeots, the two Delages, the Excelsior, Bugatti, the two Sunbeams and the two Mercedes, all of foreign extraction, will face the starter Saturday. They also decided that such American cars as the three Stutzes, two of the Mercers, two of the Maxwells, the two Burmans, the two Duesenbergs, the Mason, Gray Fox, Beaver Bullet, King, Marmon, Keeton, Braender Bulldog and the Ray will have a chance at the big money.

Pullen Shut Out

The sensation of the trial was the shutting out of Pullen, grand prix winner, and driver of the third Mercer, the little one, and Gilhooley in the Italian Isotta. How-

ever, there still remains a chance of one or both of them getting in. In case any of the thirty lucky ones is put out by accident before the race Pullen will have first call and Gilhooley second, because they rank next to the qualifiers in point of time made.

The Also Rans

As for the others that were shut out, this did not occasion much surprise, for few of the critics expected them to show the necessary speed. The list includes the Shambaugh, Texas, Pope, Titze, Tatter, Stafford, Metropoli and Washington, none of which could show speed enough to get within the charmed circle. The Great Westerns never faced the starter in the trials, two of them with broken crankcases and the other for reasons not stated.

The third Maxwell, the one for which no driver had been selected, was scratched, Ray Harroun giving as a reason that it was not ready for the race. This disposes of Hughes, who was touted for the job after

his Rayfield had broken down. Hughes, however, probably will get a job as relief driver for some of the stars.

The sensation of the last day of the trials was the wonderful performance of Georges Boillot, champion of Europe, who made good on his declaration that a speed of 100 miles an hour was possible on the Indianapolis speedway. He only tried once, but that once was enough. Driving his Peugeot he established a new record for the speedway, one that excelled the mark established yesterday by his team mate, Goux. Boillot made his lap today in 1:30.13, equal to 99.85 miles per hour.

De Palma's Third Trial

Friends of de Palma feared that the Vanderbilt cup holder would not be able to qualify. His Mercedes seemed dull of speed in the two trials it had made on Monday and Tuesday. Today de Palma was out warming up, somewhat downcast. He was unofficially timed and it was discovered that he was going at a good gait,

so he was advised to use the last shot in his locker and see what he could do. The car responded and de Palma was able to slip in the qualifying list, but it was a close squeeze at best.

The slowest car to qualify was Grant's Sunbeam at 86.40, showing that the rail birds were not so far off when they declared that it would take about 85 to get in the race. It was surprising to note that thirteen of the thirty showed better than 90 miles an hour, while seven of them beat the previous track record.

Goux Shows 98.3 M. P. H.

Indianapolis, Ind., May 26—Ten more candidates for the 500-mile race participated in the trials today, while three of those who ran yesterday made their second attempts at qualifying—Wishart, Pullen and Oldfield. This makes twenty-three of the forty-five entrants who have been through the fire. The rest of the flock will go against the watch tomorrow.

After 2 days of trials it looks as if it is going to take at least 85 miles an hour to qualify and so no one is taking any chances, but everyone is flattening the throttle to the footboards. It looks as if the trials might shut out cars that heretofore have been regarded as certain starters.

The feature today was the whirlwind drive of Goux, last year's winner, who completely upset all the theories as to the speed capabilities of the Indianapolis oval by encircling the track in 1:31.71, or an average of 98.3 miles per hour. This came after Dawson had made 1:36.20, Thomas 1:35.20 and Tetzlaff 1:33.40. Goux's lap is record for the track by a big margin.

While Goux's feat was of a phenomenal character, still the work of the two Maxwells was fully as sensational. Harroun creations, it will be remembered, were built in less than 3 months and there was considerable skepticism as to their ability to hold their rivals. Harroun, however, had guaranteed that the cars would equal the old track record of 93 miles per hour or he was not to be paid for his work. He more than made good today when first Tetzlaff reeled off the lap at the rate of 96.65 miles per hour. For good measure Harroun contributed another sensation in Carlson's performance of 93.5 miles per hour, the feature being that kerosene was used as a fuel. Considering that the Maxwells are green as yet, these are most remarkable performances.

Hughie Hughes' Rayfield six is out of it, it being announced today that the car has been withdrawn because of the breaking of a cross bridge in the crankcase, which supported the middle bearing. The times made today were as follows:

Car and Driver	Time	M.P.H.
Peugeot, Goux	1:31.71	98.3
Maxwell, Tetzlaff	1:33.40	96.65
Delage, Thomas	1:35.20	94.75
Marmon, Dawson	1:36.20	94.00
Maxwell, Carlson	1:36.60	93.50
Excelsior, Christiaens	1:38.67	90.45
Burman, Burman	1:39.55	90.4
Mercer, Wishart	1:39.73	90.25
Delage, Guyot	1:43.47	87.25
Stutz, Oldfield	1:43.60	86.75
Beaver Bullet, King	1:43.60	86.75

TIMES MADE IN INDIANAPOLIS ELIMINATING TRIALS

Car and Driver—	First Trial.		Second Trial.		Third Trial.	
	Time.	M.P.H.	Time.	M.P.H.	Time.	M.P.H.
Burman, Burman	1:39.55	90.55	.....	.....	.....	.....
Stutz, Cooper	1:42.25	88	.....	.....	.....	.....
Stutz, Oldfield	1:44	86.5	1:43.60	86.75	1:43.15	87
Gray Fox, Wilcox	1:39.16	91	1:42.50	87.8	.....	.....
Beaver Bullet, Keene	1:47.37	83.75	1:43.60	86.75	1:46.03	84.9
Peugeot, Goux	1:31.71	98.3	.....	.....	.....	.....
Peugeot, Boillot	1:30.13	99.85	.....	.....	.....	.....
Maxwell, Tetzlaff	1:33.40	96.65	.....	.....	.....	.....
Excelsior, Christiaens	1:38.67	90.45	.....	.....	.....	.....
Delage, Guyot	1:43.47	87.25	1:40.95	89.25	.....	.....
Sunbeam, Chassagne	1:43.60	86.75	1:41.91	88.75	.....	.....
Mason, Mason	1:43.22	86.75	.....	.....	.....	.....
Peugeot, Duray	1:40.00	90	.....	.....	.....	.....
King, Klein	1:43.60	86.75	1:43.63	86.75	1:46.23	84.8
Delage, Thomas	1:35.20	94.75	.....	.....	.....	.....
Burman, Disbrow	2:22.19	63.2	1:47.23	84	1:43.70	86.7
Mercedes, De Palma	1:47.40	83	1:46.98	84.25	1:42.12	87.25
Mercer, Wishart	1:41.93	88.75	1:39.73	90.25	1:37.10	92.25
Mercer, Bragg	1:36.80	93.25	.....	.....	.....	.....
Mercer, Pullen	1:47.20	83	1:46.40	84.75	1:46.14	84.50
Mercedes, Mulford	1:42.03	88.25	.....	.....	.....	.....
Stutz, Anderson	1:43.77	86.75	1:40.75	89.25	1:39.46	90.3
Maxwell, Carlson	1:36.60	93.50	.....	.....	.....	.....
Marmon, Dawson	1:36.20	94	.....	.....	.....	.....
Sunbeam, Grant	1:49.09	86	1:46.03	84.75	1:51.04	80.9
Stafford, Callahan	2:00.25	75	1:59.96	74.9	.....	.....
Metropol, Horan	2:03.08	73	.....	.....	.....	.....
Keeton, Knipper	1:40.48	89.75	.....	.....	.....	.....
Maxwell	Withdrawn.	.....	.....	.....	.....	.....
Texas, Clark	1:49.78	81.75	1:49.47	82	.....	.....
Bugatti, Friedrich	1:42.59	87.75	.....	.....	.....	.....
Great Western, Jenkins	Withdrawn.	.....	.....	.....	.....	.....
Great Western, Price	Withdrawn.	.....	.....	.....	.....	.....
Great Western, Radina	Withdrawn.	.....	.....	.....	.....	.....
Bull Dog, Chandler	1:42.81	87.75	.....	.....	.....	.....
Pope Bullet, Roberts	2:01.40	74.5	1:54.99	78.25	.....	.....
Washington, Stringer	1:57.23	76.75	1:55.86	77.7	2:03.77	72.7
Duesenberg, Rickenbacher	1:42.11	88.25	.....	.....	.....	.....
Duesenberg, Haupt	1:44.62	86	1:40.68	89.5	.....	.....
Tatter, Mazzucco	.....	.....	.....	.....	.....	.....
Rayfield, Hughes	Withdrawn.	.....	.....	.....	.....	.....
Titze, Melaun	1:49.37	82	1:52.00	80.4	.....	.....
Isotta, Gilhooley	1:46.87	84.25	1:47.38	83.75	1:48.31	83.25
Shambaugh, Shambaugh	1:51.69	80.75	1:55.00	78.2	.....	.....
Ray, Brock	1:43.38	87	1:42.47	87.75	.....	.....

Mercer, Pullen	1:46.40	84.75
Mercedes, DePalma	1:46.98	84.25

Fifteen in Monday's Trials

Indianapolis, Ind., May 25—The first day of the eliminating trials for Saturday's 500-mile race brought out fifteen of the forty-five cars entered and the feature of the day was the fact that three of these averaged 90 miles an hour for the one lap—the Bragg Mercer, the Wilcox Gray Fox and the Duray Peugeot. Bragg's time is under the official record of the track, although it is said that some of the cars did 1:36 in practice. The surprise of the day, however, was the showing of Duray's car—the baby of the speed pack, with a motor as small as a Ford. There had been fears on the part of the foreign contingent that Duray might not qualify, but now this is set at rest.

Each of the drivers has three trials in the qualifying rounds. Each must show 75 miles an hour for one lap and the thirty fastest cars will be the ones to qualify. Today Grant, of the Sunbeam, and Klein, of the King, were the only ones to take two trials. The test will wind up Wednesday afternoon. The times made today were:

Car	Driver	Time	M.P.H.
Mercer	Bragg	1:36.80	93.3
Gray Fox	Wilcox	1:39.16	91
Peugeot	Duray	1:40.00	90
Keeton	Burman	1:40.48	89.5
Mercer	Wishart	1:41.93	88.75
Stutz	Cooper	1:42.25	88
Ray	Brock	1:43.38	87
Sunbeam	Chassagne	1:43.60	86.75
King	Klein	1:43.60	86.75
King	Klein	1:43.63	86.75
Stutz	Anderson	1:43.77	86.75
Stutz	Oldfield	1:44.00	86.5
Sunbeam	Grant	1:44.09	86
Sunbeam	Grant	1:46.03	84.75
Beaver Bullet	Keene	1:47.37	83.75
Mercer	Pullen	1:47.20	83
Mercedes	De Palma	1:47.40	83



JULES GOUX, ON LEFT, AND BOILLLOT, CENTER, TALKING TO JOHNNY AITKEN, OF THE NATIONAL COMPANY, THEIR PIT MANAGER



DURAY

cars and you imagine that the rusty field-pieces of Napoleon have broken a century-long silence. They are not mere men. They are the descendants of heroes whose valor has made red the musty pages of Europe's history. Because of this glorious lineage alone, they are challengers to be feared. Blood will tell.

In Europe, George Boillot is called 'Invincible.' France hails him as the world's champion on the road. Twice he has cap-

YOU cannot help but admire the eight aliens who have journeyed across the Atlantic to sound a challenge in a strange land where language, customs and conditions are handicaps. They charm, they fascinate, they captivate. They come from fighting nations where courage and determination are an ancient heritage. They are triumph-bred. Look at them and you think of Austerlitz and Waterloo. Listen to the menacing bark of their

tured the grand prize, winning the contests of 1912 and 1913—a feat never before accomplished in the history of the French classic and only duplicated but once in the history of road racing on the continent. They having been victor in two Gordon Bennetts in succession.

Boillot was born to tame racing cars, to fight the obdurate steel monsters on dangerous turns and master them. Except for a slight preponderance of girth, he has the appearance of a trained athlete. He is of average height and heavily built. His complexion is ruddy and his hair and moustache black. He is a typical Frenchman, good natured and of a nervous temperament.

The Meteor of Speed Stars

Boillot is now at the very summit of his meteoric career. Six years ago he started as a driver of small Peugeot cars. He learned valuable lessons sitting behind single-cylinder motors that grew higher and higher, as their stroke was lengthened, until he was barely able to see over the top of the radiator. He graduated from singles to twins, from twins to small four-cylinder engines and then rode forth to court fame and win her in the 2-day grand prix of 1912.

Driving motor cars at high speed is with Boillot an art. The champion of France knows his machine and studies the course before each race. In this respect he resembles Ralph de Palma. Boillot is very observant, especially in a road race. He notices everything, rabbits scampering

across the field and pieces of tire lying in his path and calls the attention of his mechanic to them. There is a touch of vanity in his make-up. He glories in the crowd's applause. Each cheer spurs him on to more speed, more daring.

Because he is so highly strung, critics believe that Boillot may not finish Saturday's grind. The monotonous circling of the brick oval may wear on him. He may take chances under the strain that will prove disastrous. His simile is that of the master musician who delights in the changing motifs of a sonata but tires in the practicing of scales.

Jules Goux, Boillot's teammate and fides Achates, is of an entirely different type. For a Frenchman, he is cold. He hails from the Franche Comte, famous as the home of hard-headed, unemotional men. This inheritant calmness, this splendid control of his nerves aids him in his track driving, in which he has proven himself a master at Brooklands. Before the start of a race, Goux is cool and determined.

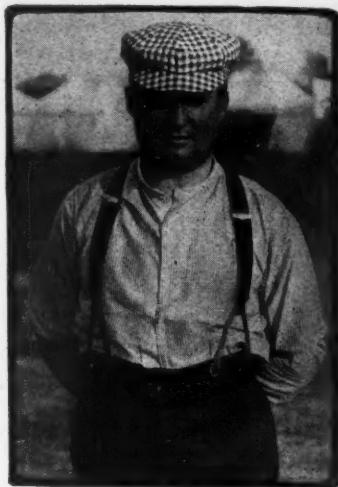


CHASSAGNE

Boillot is just as determined, but is excited. His heart beats faster. He is impetuous to be off.

In stature Goux is not as formidable appearing as Boillot, but he is just as finely trained and as strong. He gives one the impression that he is a dandy, a boulevardier. He is immaculate in his dress and looks more like a young Englishman than a Frenchman. Like Boillot, he is very jovial and a bit of a humorist in a quiet and satirical way.

Although fast friends and true team-

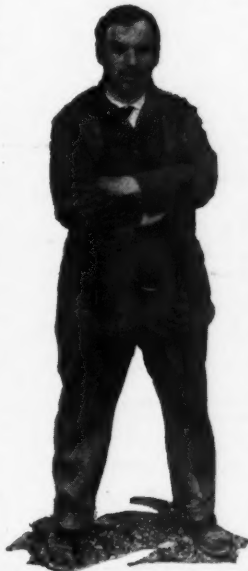


GUYOT

mates, Goux and Boillot are keen rivals. In each of their hearts a bit of jealousy rankles. Ill luck ever has pursued Goux in his races with Boillot. Only once has the 500-mile race winner of 1913 finished ahead of his teammate, and that was in the 1912 contest at LeMans, where Boillot's car was eliminated before the end of the race. Fate seems to have picked him as a runner-up in races with the more brilliantly performing Boillot.

Goux is Boillot's guide in the latter's first invasion of America. He was taken him to the circus, introduced him to pie a la mode and ice cream soda and taught him to whistle ragtime tunes. Their favorite selection is "You Made Me Love You, I Didn't Want To Do It." They also have picked up a few choice bits of American slang. Except when tuning up their cars or discussing race details with Johnny Aitken, their pit manager, they conduct themselves like two boys out for a lark.

Should Arthur Duray capture Saturday's race in



FRIEDRICH

the baby Peugeot, the American eagle would have some reason to scream. Although his parents are Belgians and he passes as a Frenchman, Duray claims America as his birthplace, the stork dropping him down the chimney of a house on Twenty-seventh street, New York. Duray is no novice at the speed game. He has been driving racing cars for the past 15 years and is the patriarch of the invading troupe. You will find his name in the early records of motoring. He finished fifth in the Gordon Bennett of 1905 and was a participant in two of the Vanderbilt cup races run on Long Island and in the first grand prize held at Savannah.

Laughs When He Loses

Duray is to the French racing game what Rube Waddell was to American baseball, a most eccentric character. His conduct in the 1907 grand prix is typical of him. He looked like a certain winner and led Nazzaro until within 20 miles of the finishing line. Then a broken bearing put him out. The average driver would have cursed his luck, but not Duray. He raced to the pits, swinging his cap and whooping like a wild Indian. Duray is a jolly good fellow, never serious and always playing practical jokes.

Albert Guyot, who drove the Sunbeam in last year's race and who will be at the wheel of the Delage Saturday, drives motor cars for sport and sells them as a business. His mechanical affinity is the Delage. He acts as agent for that make of car at Orleans and has been a member of the Delage racing team since the company first entered the European speed classics.

Rene Thomas, Guyot's teammate, is a graduate of the school of hard knocks. He started in as a motorcycle rider and although he made little money at this sport, he gained much experience and acquired a technical education that stood him in good stead when he left the seat of the motorcycle to drive small cars.

Unlike most French drivers, Thomas works on his car from morning until night before a race instead of permitting his mechanic to wield file and hammer under his direction. He is a born mechanic and can do a thing quicker and better than he can explain to another. For a Frenchman, Thomas is very serious, but life always has been serious for him. He never has had time to play.

One look at Joseph Christiaens, the driver of the Excelsior, and you would know he was a Belgian. He has the bulky frame and fair complexion of the north countryman and is slow, methodical and careful. He has the temperament that makes him a dangerous contender in a race. He is too calm to get excited and too good an engineer to abuse his car.

Christiaens is intensely interested in mechanics. Not only has he designed motor cars but he has experimented with aeroplanes and wireless telegraph apparatus. In the early days of the sport, he was head of the Darracq racing depart-

ment and later engineer with the Vivinus company, for which he built motor cars and aviation motors.

Jean Chassagne, although he will represent England in Saturday's race, is a Frenchman. He was born and has lived until recently in the picturesque mountain district of the republic. When 19 years of age, he ran away from home and enlisted in the French navy. He served 2 years in the engine room of a battleship, spent another 2 years in coast defense



THOMAS

work and then was assigned to the submarine corps.

Leaving the navy because of poor health, he secured a position as mechanic with the Bayard-Clement racing team, with which he came to America for the Savannah grand prize. He left the Bayard-Clement forces and joined the Sunbeam crew 2 years ago. He pumped oil on the Sunbeam that won the small-car division of the 1912 grand prix and last year was promoted to the position of driver. He made good in a day, finishing third in the 1913 grand prix. He was then ordered to shatter a few Brookland records, which he did with the six-cylinder and twelve-cylinder English Sunbeams.

Ernest Friedrich comes to America with the "Made in Germany" label on him. He was born in Paris of German parents but has spent the greater part of his life in the Fatherland. After serving in the kaiser's army, he secured employment in the Bugatti shops and has always been identified with that company. He is the dark horse of the foreign contingent.



CHRISTIAENS

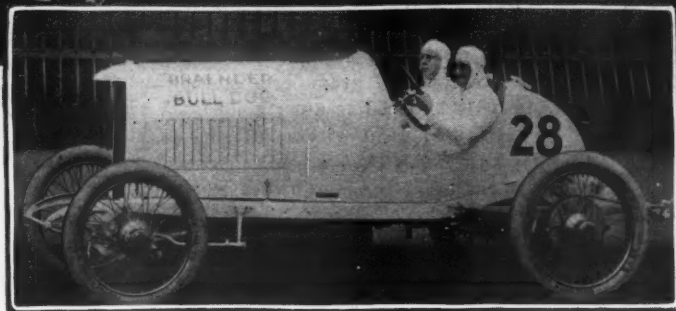
Speedway Race Brings Out Novel Engine Designs

Mechanical Features of 500-Mile Sweepstakes Cars



By Darwin S. Hatch

INDIANAPOLIS, IND., May 22—Now that all but three of the forty-five entries in the 500-mile race, May 30, have appeared at the speedway for practice, an excellent opportunity is offered to compare the designs and examine the original ideas which have been worked out for this race. The three cars



THREE DEBUTANTES AT INDIANAPOLIS

In the upper left-hand corner is Hughes' new Rayfield, photograph copyrighted by Coburn, Indianapolis. In the upper right-hand corner is Clark's Texas. Below is the Bulldog, built by Ralph Mulford and to be driven by Chandler. This is the Braender tire entry

which have not as yet put in an appearance are not considered as serious contenders by the wise ones in the training camps.

The most notable of the tendencies in the racing cars this year, is the effect of the success of the foreign cars in the last 500-mile race. Practically all of the new American cars—those which have been designed during the

DETAILS OF THE CARS ENTERED IN THE FOURTH ANNUAL INTERNATIONAL SWEEPSTAKES, MAY 30, AT

No.	CAR	DRIVER	No. CYL'S	BORE & STROKE INCHES	PISTON DISP.	CAST.	VALVES				MAGNETO	No. Dist.	No. Plugs	CARBURETER
							Diameter	Lift	Location	Operation				
1	Burman	Burman	4	5.10x5.50	449.4	Pairs.	2*	1	Head	Fork rocker	Remy	2	8	Rayfield
2	Stuts	Cooper	4	4.80x6.00	434.3	Pairs.			Opposite	2 Camshafts	Bosch			Schebler
3	Stuts	Oldfield	4	4.80x6.00	434.3	Pairs.			Opposite	2 Camshafts	Bosch			Schebler
4	Gray Fox	Wilcox	4	5.00x5.50	431.9	Pairs.			Head		Bosch			Rayfield
5	Beaver Bullet	Keene	4	5.10x5.50	449.4	Pairs.	3	1	Opposite	2 Camshafts	Bosch	2	8	Rayfield
6	Peugeot	Goux	4	3.90x7.08	341.7	Block			Head	2 Camshafts	Bosch		8	Claudel
7	Peugeot	Boillot	4	3.90x7.08	341.7	Block			Head	Overhead Camshaft	Bosch		8	Claudel
8	Maxwell	Tetzlaff	4	4.20x8.00	445.0	Block	2.75	1	Head	Overhead Camshaft	Bosch	1	4	Harroun
9	Excelsior	Christians	6	3.80x6.20	446.6	Pairs.			L Head	Single Camshaft	Bosch		2	Rayfield
10	Delage	Guyot	4	4.10x7.08	380.2	Block	2*	1 1/2	Horizontal	Fork Rocker	Bosch	2	8	Claudel
12	Sunbeam	Chassagne	6	3.14x5.90	275.0	Threes			L-Head	Single Camshaft	Bosch			2 Longuemare
13	Mason	Mason	4	4.40x6.00	360.7	Block	2 1/2	1	Head horizontal	Vertical Rocker	Not Dec	1		Schebler
14	Peugeot	Duray	4	3.07x6.14	183.0	Block			Head 30 degrees		Bosch		8	Claudel
15	King	Klein	4	5.10x5.50	449.4	Pairs.	3	1 1/2	Opposite	2 Camshafts	Bosch	2	8	Rayfield
16	Delage	Thomas	4	4.10x7.08	380.2	Block	1 1/2	1 1/2	Horizontal	Fork rocker	Bosch	2	8	Claudel
17	Burman	Disbrow	4	5.10x5.50	449.4	Pairs.			Head	Fork rocker	Remy	2	8	Rayfield
18	Mercedes	DePalma	6	4.10x5.50	445.0	Pairs.	2	1 1/2	Head	Side camshafts	Bosch			Rayfield
19	Merced	Wishart	4	4.80x6.20	445.0	Pairs.	3	1 1/2	Opposite	2 Camshafts	Bosch	2	8	Rayfield
21	Merced	Bragg	4	4.80x6.20	445.0	Pairs.	3	1 1/2	Opposite	2 Camshafts	Bosch	2	8	Rayfield
22	Merced	Pullen	4	3.75x6.75	298.2	Block	2 1/2	1	Side	1 Camshaft	Bosch	2	8	Rayfield
23	Mercedes Special	Mulford	4	4.40x7.20	448.0	Block			Head	Overhead Camshaft	Bosch	2	8	Rayfield
24	Stuts	Anderson	4	4.80x5.75	416.2	Pairs.			Opposite	2 Camshafts	Bosch			Schebler
25	Maxwell	Carlson	4	4.20x8.00	445.3	Block	2 1/2	1	Head	Overhead Camshaft	Bosch	1	4	Harroun
26	Marmion	Dawson	4	4.50x7.00	445.0	Pairs.	2 1/2	1	Side	2 Camshafts	Bosch			Claudel
27	Sunbeam	Grant	6	3.14x5.90	273.0	Threes	2	1 1/2	Side L-Head	1 Camshaft	Bosch			Rayfield
28	Stafford	Callahan	4	4.20x7.10	290.7	Pairs.			Head	Overhead Camshaft	Bosch	1	8	Rayfield
29	Metropole	Horan	4	4.20x7.10	446.0	Block			Opposite	2 Camshafts	Not Dec		4	Rayfield
31	Keeton	Knipper	4	5.10x5.50	449.4	Pairs.			Opposite	2 Camshafts	Remy	2	8	Harroun
32	Maxwell		4	4.20x8.00	445.0	Block	2 1/2	1	Head	Overhead Camshaft	Bosch	1	4	Harroun
33	Texas	Clark	4	5.10x5.50	449.4	Pairs.	3	1 1/2	Opposite	2 Camshafts	Bosch	2	8	Rayfield
34	Bugatti	Friedrich	4	3.90x7.10	350.0	Block			Head	Overhead Camshaft	Bosch			Zenith
35	Great Western	Jenkins	4	4.20x8.00	445.0	Block			In Piston	Carter Piston Valve	Not Dec			Schebler
36	Great Western	Prie	4	3.70x5.70	254.0	Block			In Piston	Carter Piston Valve	Not Dec			Schebler
37	Great Western	Radina	4	4.20x8.00	445.0	Block			In Piston	Carter Piston Valve	Not Dec			Schebler
38	BraenderBulldog	Chandler	4	4.30x6.00	350.0	Block	2 1/2	1 1/2	Head		Bosch	2	8	Rayfield
39	Pope Bullet	Roberts	4	4.70x5.70	407.0	Pairs.	2 1/2	1 1/2	Head	Vertical Rockers	Bosch	2	8	Rayfield
41	Washington	Stringer	4	4.70x5.70	407.6									
42	Duesenberg	Rickenbacher	4	4.40x6.00	360.5	Block	2 1/2	1 1/2	Head Horizontal	Vertical Rocker	Not Dec			Master
43	Duesenberg	Haupt	4	4.40x6.00	360.5	Block	2 1/2	1 1/2	Head Horizontal	Vertical Rocker	Not Dec			Schebler
45	Tatter	Mazzucco	4	4.10x5.30	286.0									
46	Rayfield	Hughes	6	4.10x5.50	442.6	Block			L-Head Inclined	2 Camshafts	(2) Mea	1	12	Rayfield
47	Titze	Melaun	4	5.10x5.50	449.4									Rayfield
48	Ray	Brock	4	5.10x5.50	449.4	Pairs.	3	1 1/2	Opposite	2 Camshafts	Mea	2	8	Rayfield
49	Isotta	Gilhooley	4	4.10x7.10	375.0	Pairs.	1 1/2	1 1/2	Head 15 degrees	Overhead Camshaft	Bosch	2	8	Longuemare
51	Shambaugh	Shambaugh	4	5.10x5.50	449.4	Pairs.					Bosch	1	4	Schebler

Note—Equipment listed is not final on many cars as changes are being made frequently.

*16 valves.

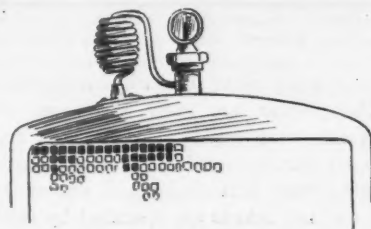
†Head a single casting.

**12 valves.



At the left is shown the intake side of Wishart's Mercer motor, with its ramshorn manifold and transverse magneto. At the right is the six-cylinder Sunbeam engine with a separate carburetor for each set of three cylinders

past 12 months—show a decided attempt to follow or improve on foreign design. This is particularly true as regards the valve action. The old T-head and L-head constructions which has been the American standby for many years has given way in the newer designed American racers to some type of over-head valve arrangement in nearly every case. The new Maxwell, Burman's new cars, the Stafford are over-head valve construction, two of them with over-head camshafts, and Burman's car with side camshafts, double valves and forked rocker arms quite similar to the old Delage. Hughes' new Rayfield, while not a valve in the head design, approaches it



Radiator of Burman showing condenser

quite closely in that the valves are set very close to the combustion chamber and are inclined toward the latter.

Another tendency which also may be credited to last year's foreign invasion is

the attempt toward very light reciprocating parts and lessened vibration, both in the effort to produce high-speed motors. Harroun, Burman, Hughes, Mulford in his Bull Dog, and Dusenber, Delling in the Mercers, and Dawson in the old Marmon all have been successful in obtaining motors of quite high speed by the lightening of connecting rod and piston assemblage, by improved balance and by improved oiling systems in the motor.

Sloppiness Disappearing

The general sloppiness of many of the American racers of olden days has disappeared in nearly every instance. This may be credited to a certain extent to

INDIANAPOLIS — INCLUDING DRIVERS, MOTOR FEATURES AND THE EQUIPMENT THAT PROBABLY WILL BE USED

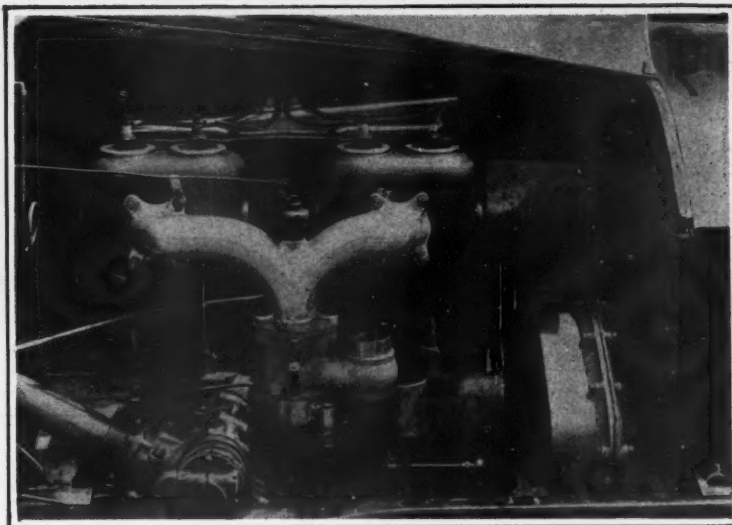
WHEEL-BASE	GEAR RATIO	TIRES		WHEELS	DRIVE	SHOCK ABSORBERS	SPARK PLUGS	LUBRICATION	OTHER EQUIPMENT	CAR	No.
		Make	Size								
109.25	2-1	Nassau	33x44	Houk	Shaft	Hartford	Undec	Dixons	Motometer	Burman	1
				Wood	Shaft	Hartford		Dixons	Motometer	Stutz	2
				Wood	Shaft	Hartford		Dixons	Motometer	Stutz	3
96	2 1/2-1	Undecided	34x44	Houk	Shaft	Hartford	Undec	Dixons	Motometer	Gray Fox	4
101	Undecided	Undecided	35x4	Dunlop	Shaft	Hartford	Bosch	Castor and Dixons	Motometer	Beaver Bullet	5
	3-1	Dunlop	32x5	Wire	Shaft	Hartford	Bosch	Castor	Motometer	Peugeot	6
	3-1	Dunlop	33x5	Wire	Shaft	Hartford	Bosch	Castor	Motometer	Peugeot	7
105	2-1	Palmer	33x5	Houk	Shaft	Hartford	Bosch	Polarine & Dixons	Motometer	Maxwell	8
	2-1	Cord	34x5 1/2	Adex	Shaft	Hartford	Bosch	Castor, Vacuum & Dixons	Motometer	Excelsior	9
104	3-1	Cord	35x6	R-W	Shaft	Hartford	Bosch	Castor	Motometer	Delage	10
83	3-1	Dunlop	34x44	R-W	Shaft	Hartford	K. L. G.			Sunbeam	12
106	2-1	Undecided	34x44	Wood	Shaft	Hartford	Bosch	Texaco, Gredag, Dixons	Motometer	Mason	13
	3-1			Wire	Shaft	Hartford			Motometer	Peugeot	14
112	2-1	Empire	33x44	Houk	Shaft	Hartford	Bosch	Havoline, Oildag, Dixons	Motometer	King	15
104	3-1	Cord	35x6	R-W	Shaft	Hartford	Bosch	Castor	Motometer	Delage	16
109.25	2-1	Nassau	33x44	Houk	Shaft	Hartford	Undec	Dixons	Motometer	Burman	17
107	2 1/2-1	Undecided	34x5 1/2	R-W	Chain	Mercedes	Bosch	Monogram, Oildag, Dixons	Motometer	Mercedes	18
112	2 1/2-1	Palmer	35x5	R-W	Shaft	Hartford	Bosch	Castor, Dixons	Motometer	Mercoer	19
112	2 1/2-1	Palmer	35x5	R-W	Shaft	Hartford	Bosch	Castor, Dixons	Motometer	Mercoer	21
110	3-1	Palmer	35x5	R-W	Shaft	Hartford	Bosch	Castor, Dixons	Motometer	Mercoer	22
		Braender	36x5	Houk	Chain	Mercedes	Bosch	Castor, Oildag		Mercedes Special	23
				Wood	Shaft	Hartford	Undec	Dixons	Motometer	Stutz	24
					Shaft	Hartford	Bosch	Polarine & Dixons	Motometer	Maxwell	25
120	2 3/4-1	Palmer	34x44	Houk	Shaft	Hartford	Bosch	Oildag	Motometer	Marmon	26
116	2 1/2-1	Palmer	35x5	Steel	Shaft	Hartford	Bosch	Monogram & Dixons	Motometer	Sunbeam	27
111	2 1/2-1	Miller	34x4	Wire	Shaft	Hartford	Undec	Texaco & Dixons	Motometer	Stafford	28
110	Undecided	Nassau	35x5	R-W	Shaft	Hartford	Undec	Dixons	Motometer	Metropole	29
	2 1/2-1	Undecided	33x44	Houk	Shaft	Hartford	Undec	Dixons	Motometer	Keeton	31
105	2-1	Palmer	34x44	Houk	Shaft	Hartford	Bosch	Polarine & Dixons	Motometer	Maxwell	32
100	2 3/4-1	Undecided	35x5	Houk	Shaft	Hartford & Ames	Bosch	Mobiloil, Oildag, Dix	Motometer	Texas	33
		Continental	33x5	Houk	Shaft	Hartford	Bosch			Bugatti	34
	2 1/2-1	Miller	35x4 1/2	Houk	Shaft	Hartford & Ames	Undec	Oilzum		Great Western	35
	2 1/2-1	Miller	35x4 1/2	Houk	Shaft	Hartford & Ames	Undec	Oilzum		Great Western	36
	2 1/2-1	Miller	34x4	Houk	Shaft	Hartford & Ames	Undec	Oilzum		Great Western	37
105	2 1/2-1	Braender	35x5	Dunlop	Shaft	Hartford	Rajah	Oilzum, Oildag, Dixons	Motometer	Bulldog	38
124	2 3/4-1	Undecided	36x5	Wire	Shaft	Hartford	Bosch	Dixons	Motometer	Pope Bullet	39
										Washington	41
106	2-1	Undecided	34x44	R-W	Shaft	Hartford	Bosch	Texaco, Gredag, Dixons	Motometer	Duesenberg	42
106	2-1	Undecided	34x44	R-W	Shaft	Hartford	Bosch	Texaco, Gredag, Dixons	Motometer	Duesenberg	43
										Tatter	45
104	2 1/2-1	Riverside	34x44	R-W	Shaft	Hartford	J-D	Dixons		Rayfield	46
										Titze	47
108	Undecided	Silvertown	33x44	Houk	Shaft	Hartford	Undec	Monogram, Dixons	Motometer	Ray	48
115	2-1	Palmer	35x5	Riley	Chain	Ames	Bosch	Monogram, Dixons	Motometer	Isotta	49
		Silvertown	34x44	Houk	Shaft	Hartford	Undecided	Undecided		Shambaugh	51

the showing made by the foreign cars a year ago, whose fine workmanship was generally remarked.

As to the speed creations which have been sent this year from Europe to defend the title wrested from the Americans last Memorial day, the interest is as high as ever. Seven different makes of foreign cars are on the grounds and they have come prepared to humble the Americans for the second time. The Peugeots, the Sunbeam, the Isottas and the Mercedes, which formed the foreign delegation of 1913, again appear and with their number reinforced. In addition there is the Bugatti, the two Delages and the Excelsior. All of them Europe's fastest speed creations. They all have high-speed motors with exceptionally light reciprocating parts and with very efficient valve mechanism and oiling systems. With two exceptions, the Sunbeam and Excelsior, the over-head valve design is employed. In the case of the Sunbeam, the valve in the head effect is approached with the L-head construction by inclining the valves toward the combustion chamber.

Burman's two cars, which are his own design, are quite European so far as the motor is concerned. Both of them are alike in every respect and are four-cylinder creations with the cylinders cast in pairs. They are 5.4 inches bore and 5.5 inches stroke, giving them a piston displacement of 449.4, just within the speedway limit. Although he has shown no exceptionally fast time on the track, Burman says that he has had the motor turning at 2,400 r.p.m., at which speed it developed 134 horsepower on the block. The distinguishing feature of the motor is its valve operation. The valves are on an angle of about 30 degrees and project directly into the combustion space. There are sixteen valves, two exhausts and two intakes to each cylinder, the exhausts being on one side of the cylinders and the intakes on the other.

They are 2 inches in diameter with a $\frac{1}{2}$ -inch lift. The valves are operated through two camshafts, one on either side, which operate push rods at whose upper end are connected long walking beams, which reach clear across the motor and work the valves on the opposite side. These walking beams are forked so that one push rod operates the two valves in either cylinder. The walking beams are mounted near their centers on a rather high pillar, one pillar carrying the two rocker arms for a cylinder. A scheme similar to this has been tried out in Europe and discarded on account of poor operation of the valve caused by



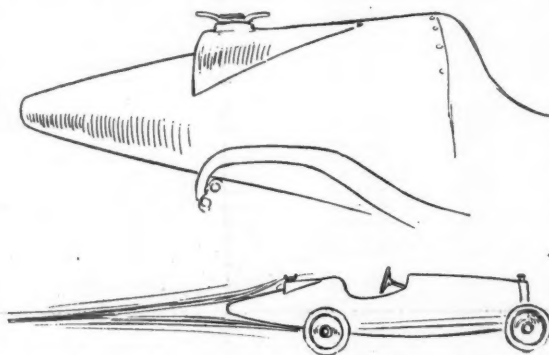
Dawson's Marmon motor from the intake side

unequal warping of the forked rocker arms.

The pistons are steel and connecting rods are very light so that high speed may be obtained without undue vibration. Burman uses left drive and center control and the brakes are operated by cables. The radiator carries a condensing coil in addition to the filler cap and motometer. Burman carries 35 gallons of gasoline, which he calculates will carry him 350 miles of the race.

Keeton Is Spectacular

Knipper's Keeton is one of the spectacular cars in looks as well as speed. The oddity in looks is due to the radiator location back of the motor. The latter is covered with the sloping European type of hood, which is simply a screen. The engine has T-head cylinders, cast in pairs, the four cylinders being 5.1 by 5.5 inches, giving it a displacement of 449.4, the same



Streamline tail of the Rayfield and the way Hughes says the smoke and dust focuses behind the car due to its lines

as the Burman's. The car weighs 2,350 pounds empty, only 100 pounds more in the rear than in front. There is a special brace to steady the steering column. There are eight spark plugs with a double distributor magneto, cable brakes are used in the car.

The utmost secrecy is maintained in regard to the construction and design of the three Stutz cars.

The only authentic information obtainable

in regard to the cars is that they are under the displacement limit, have four-cylinder motors, shaft drive with the transmission on the rear axle, Hartford shock absorbers, Bosch magnetos, and Schebler carbureters. It may be assumed that the motor is a T-head type, cast in pairs. The motors of the Cooper and Oldfield cars are said to be 4.8 by 6 and Anderson's 4.8 by 5.75.

Keene's Beaver Bullet is a four-cylinder car with a Wisconsin T-head motor, cylinders cast in pairs. It is conventional in design except for the fact that the oil tank is carried under the frame lengthwise of the right frame member. A shield is provided for the driver like that on the Keeton. A streamline effect is gained in the front by a pointed nose, and tapered hood. S. R. O. bearings are used throughout.

The two Peugeots, which are to be driven by Goux and Boillot, are the ones that finished first and second at the Amiens Grand Prix of France at an average speed of 72.1 miles per hour. The two racers have a four-cylinder block motor of 3.9 by 7.08 bore and stroke, giving a displacement of 341.7 cubic inches. In general design they are similar to that of last year's winner. The valves are in the head, and are set into the cylinder at an angle of about 30 degrees. The valves are in duplicate throughout, and the seats are on the under side of the cylinder castings, so that when the valves are raised they are closed. They are operated by a single camshaft running over the top of the cylinders covered by an aluminum housing and driven by a vertical shaft from the crankshaft. The pistons are cut from solid blocks of steel and the crankshaft runs on S. R. O. ball bearings.

Oil is forced to the engine bearings at a pressure of 30 pounds per square inch. The pressure employed in most of the American racers is in the neighborhood of 2 pounds. A 3.00 to 1 gear ratio is used and the engine is expected to turn over 3,000 r.p.m. The front springs are underslung this year to get the cars lower and also as a special provision for the speedway, the left frame members have been weighted with lead so that the cars will hold the turns better.

Smallest Car in Race

Duray's Peugeot is the smallest car in the race. Its piston displacement is only 183 cubic inches, which is only 6 cubic inches greater than that of the Ford, and less than that of the smallest Maxwell models. This car is known as the 3-Liter Peugeot, because with it Boillot won last year's coupe de l'auto event.

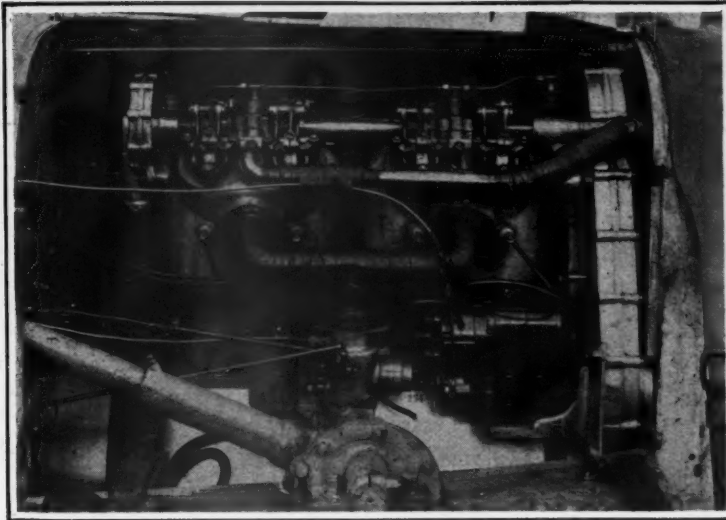
It has a bore of 3.7 and a stroke of 6.14 and is considered the most efficient racing motor ever built, the power curve showing 92 horsepower at 2,870 revolutions per minute. The car has shown 95 miles per hour for the measured kilometer. Although not having the same maximum speed of some of the other cars, the fact that the Peugeot can cover the full distance of next Saturday's race without a stop for tires, gasoline or oil, will give it a certain advantage.

Ralph Mulford's Mercedes entry is one that brings together three winners, Mulford himself winner of the 1910 Vanderbilt Cup, has fitted in the old Schroeder Mercedes, which is twice winner of the Vanderbilt, the Peugeot, which Goux drove to victory in the 500-mile race last year. Mulford tried to enter the Peugeot car complete at Indianapolis, but was unable on account of the rule forbidding more than three cars of one make starting in a race run under the A. A. A. sanction. He reconstructed the motor and fitted it to de Palma's old war horse in place of the Mercedes engine. The engine is practically the same as last year except that the bore has been increased slightly and the stroke lessened a little. The old Mercedes chassis is practically the same as always, being one of the few with chain drive and having 180-inch wheelbase.

De Palma's Mercedes Six

DePalma's new six-cylinder Mercedes is one of the speediest looking cars in the race. It has a long-pointed nose and pointed radiator and streamline, the hood being shaped somewhat like the hull of a speed boat with a reverse curve to throw the wind out. The radiator is hung on trunnions and there is a screen in front. The cylinders are cast in pairs and the valves are over-head in the old Mercedes style. The car is chain drive and a spout is provided from the oil system which shoots oil on each chain at the front sprocket. The pistons are of cast iron, but the cylinders are of steel and a block of two cylinders weighs just 22 pounds. Wind resistance is cared for even to pointing the starting crank.

The car in which the streamline is carried out to the greatest extent is Hughie Hughes' new Rayfield. This is the design of William Rayfield and Hughes and will make its first appearance at Indianapolis. The motor was built by the Rayfield Motor Co., and is of six cylinders, 5.135 by 5.5. The valves are placed so close to the bore of the cylinders that though the cylinders are L-head, the effect is almost the same as the over-head system, as there are practically no pockets and the explosion is concentrated above the pistons.



Motor of the Stafford showing the open overhead camshaft with its chain drive

Hughes has aimed to keep the whole car very light and has kept the weight down to 1,950 pounds.

In carrying out the streamline effect, in order to do away with the usual banking of the air against the dashboard when it comes through the radiator in front, two radiators have been placed on the side of the car just in front of the dash and extending out from it, allowing the same amount of cooling surface on each side of the car as there ordinarily is in the front radiator. This permits a very narrow body and at the same time allows the hood of the car to come to a point so that the air goes through the cooler and passes on without banking against any part of the car. Two magnetos are used, both on the same longitudinal shaft, one along side the engine, and the other behind the rear engine support. There are two sets of plugs, one set being vertical over the exhaust side and the other in-

the exhaust comes out of the latter. In fact, all the dust in the back of the car instead of curling outward and upward as usual collects at a point some 50 yards in the rear of the car, according to Hughes.

One of the features of the car is that the drive and torque is taken through the springs alone. These are very flat and end on a cross tube, which extends clear across the car. The engine is ball bearing throughout and hung on two tubes, one at the front and one at the rear. In the oiling system is a neat oil radiator through which the oil is pumped during its circulation to cool it.

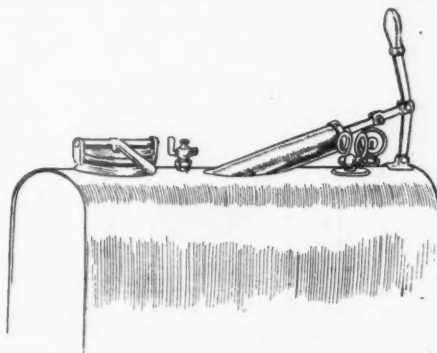
The workmanship on the car is particularly good, a great deal of it being handwork, for instance, the spring hangers, pump mounting, cylinder plugs and so on are handcut out of solid blocks of steel.

The Two Delages

The two Delage cars, which are to be driven by Guyot and Thomas, are the only cars which the Peugeot drivers profess to fear. This is the first appearance of these cars at the speedway. They are the same in every respect, they have four-cylinder block motors of 4.1 by 7.08 inches. They develop 130 horsepower at 2,000 r.p.m., and both of them are Grand Prix winners. Thomas' machine established the European road racing record of 76.8 miles per hour at LeMans last summer. This was the car reported to have been bought by an American for the Grand Prix and Vanderbilt at Santa Monica.

Delage machines have an enviable record, in that they never have failed to finish their races and never has a bonnet been lifted or a tool used during a race. The cylinders are block casting with four valves per cylinder, mounted horizontally. The crankshaft is carried on five M. & D. ball bearings and ball bearings are used for crankshaft, pump and magneto shaft. The crankshaft had to be built up on account of the use of the five ball bearings. It is hollow, as are the camshafts, and in order to make the motor rigid and still light, a girder is carried under each main bearing. The valve diameter is 55 millimeters and the lift 9 millimeters. The valve operation is by push rod and bell crank. Each one having two arms and operating a pair of valves.

To make these light the valve tappets and push rods are hollow, and like the cylinder walls, are only 1 millimeter thick. The exhaust opening has a lead of 45 degrees and the intake closing a lag of 20 degrees. Steel pistons are used with two rings. Pistons are drilled. Two independent magnetos are fitted, one driven off the cross shaft, which operates the water pump, and the other lengthwise.



Top of tank on De Palma's Mercedes, showing large quick-opening filler cap, hand pump and pressure gauge

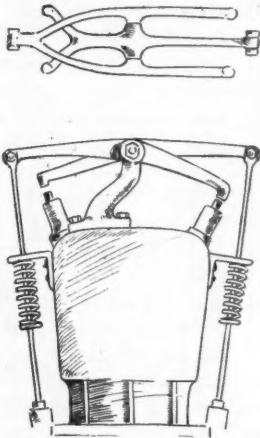
clined at about 45 degrees on the carbureter side. The carbureter is attached directly to a waterjacketed manifold on the opposite side from the valves.

Effect of Streamline Body

The streamline idea has been so well-carried out that the exhaust gas, which is lead back to the rear through a pipe which ends about 2 feet to the left of the tail is drawn toward the point of the tail and when the car is moving it appears that

The eight plugs are mounted in the heads of the cylinders. Each magneto has its own switch so that the failure of either would cause it stopping.

The Memorial day race will be the premier of the Bugatti in America. Throughout Europe, Ettore Bugatti is recognized



Burman's unique valve operation; the two inlets and two exhausts are operated by forked rocker arms

as one of the cleverest of the world's motor car engineers. The car is quite small and very light and has a number of unusual features, particularly in the matter of suspension. The motor is a four cylinder with double intake and single exhaust valves in the head, driven by an overhead camshaft. A rear spring is very heavy cantilever type and the front springs are semi-elliptics, but are double, that is, there are two very light and narrow semi-elliptic springs side by side on either side of the car. Streamline effect has been carried out in the front with a sloping hood and narrowed radiator. A peculiar type of shock absorber is employed at the front, this being a secret design, but it is connected between the left and right frame horns in front of the radiator and seemingly is a friction type. The ends near the frame horns operate on 1-inch rollers.

Excelsior a Newcomer

One of the few six-cylinder cars is the Excelsior, which also will be seen for the first time in America. The car is the one that finished eighth in the French Grand Prix at Amiens last year. The valves are on one side with L-head cylinders cast in three. Two Claudel carbureters are used with very large manifold. Crankshaft is carried in seven plain bearings through which oil is delivered under high pressure. The weight of the car is 1,980 pounds. The reciprocating parts are very light steel pistons and hollow connecting rods. The cone clutch has a locking arrangement by which the drive shaft is connected directly to the engine to prevent any trouble from a slipping clutch, as this circumstance lost the Excelsior one race. A special four speed gear box is used, which has hollow shafts. The axles have hollow drive shafts, which are machined out of

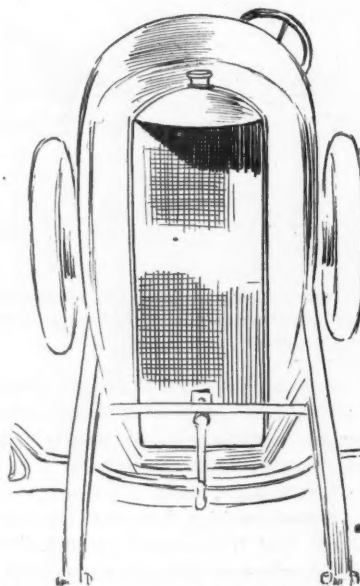
the solid. A special radiator for cooling the oil is set in the frame and the feed level is maintained by a vacuum arrangement.

The English Sunbeams

Of the two Sunbeams, one has been built specially for the speedway and has a wheelbase of only 83 inches. It is to be driven by Chassagne, who has put up several world's records at Brooklands. Grant's car has been campaigned before. This is one of the 1913 Grand Prix de France cars. It has a motor of 3.14 by 5.90 bore and stroke, giving it a displacement of 273 cubic inches, which is the same as in the standard 16-20 horsepower, four-cylinder Sunbeam touring car.

All except the engine the new special car is smaller than the older one, it embodies features which are the result of last year's experience at Indianapolis, while the chassis is specially built, the motor is the one with which Chassagne made the 12-hour record at Brooklands, averaging 85 miles per hour. A special feature is that it is fitted with two carbureters and two inlet pipes. Its wheelbase is only 83 inches, the shortest in the race, and this necessitated the designing of a special gearbox with very short shaft and giving only two speeds. The oiling system has been changed somewhat in the endeavor to cool the oil instead of carrying the most of it in the base chamber, it is in a tank at the back of the chassis. A pipe of large diameter to avoid skin friction is led from this tank to the pump in the base chamber and oil is forced to all the bearings.

A second pump forces it immediately away from the engine back to the tank, so that it is not exposed to the engine heat for any length of time. Grant's is fitted with steel wheels that look like wood. The brakes on the rear hubs have cooling flanges on the drums, and the brake crossrod runs through the bottom of the



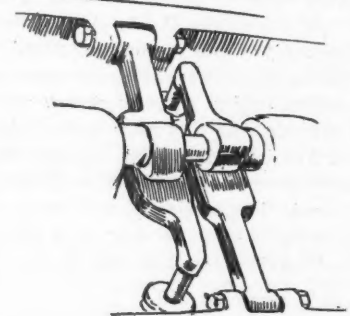
Front view of Chandler's Bulldog. A very high and narrow radiator with long sloping hood are features

differential housing. The exhaust manifold is pointed at the front and the effort has been throughout to reduce wind resistance. The hood is very long and pointed, extending back nearly to the rear axle a transmission brake is used back of the gearset and the car weighs 2,250 pounds.

It is probable the kerosene will be used as fuel in at least one of the three Maxwell racing cars which Ray Harroun has built and two of which are to be driven by Tetzlaff and Carlson. These cars have more unusual features than any of the others. One thing about them pleteness of the design and the care with which it is carried out. The three cars are alike and have a block motor of 4.2 by 8. The crankshaft is supported on two ball bearings and one plain bearing. Rhineland bearings being used on crankshafts and camshafts. One of the unique features of the car is that it has no flywheel. The crank throws being upon disks which take the place of the flywheel.

To Race on Coal Oil

Harroun believes that better balance can be obtained by distributing the weight along the crankshaft rather than by con-



Detail of overhead camshaft valve mechanism on the Maxwells

centrating it at one end as is done by the conventional flywheel. The cylinder head is detachable and carried the over-head valves, which are operated by single camshafts above them. The exhausts and intakes are on opposite sides of the engine and very clear and short passages communicate with the manifold. The camshaft drive is by a vertical shaft running upward from a spiral gear connected with the crankshaft. Gears and shafts are enclosed and the latter has universal joints at either end. Camshaft operates the valves through short rocker arms pivoted for exhaust and intakes on opposite sides of the housing in the cylinder head. The whole valve mechanism is inclosed by a plate. The reciprocating parts are very light, the pistons are magnalium and weigh 17 ounces. The connecting rods are chrome steel of webbed I-beam section. Compression chambers are polished inside.

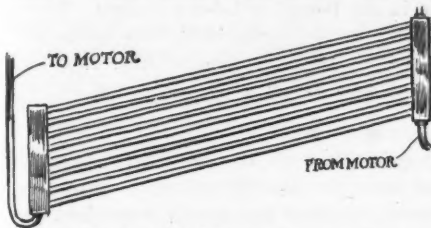
The motor has a novel oiling system. The system is so arranged that stopping of the hand pump causes over-lubrication instead of the reverse, a much less serious and more easily remedied difficulty. The

oil is forced by an engine-driven pump through large pipes directly from the tank at the rear to the engine bearings, the cylinders being lubricated by the spray, but there is no splash chamber in the crankcase. The excess oil from the bearings gathers in the crankcase, from which it is returned to the oil tank at the rear.

Normally the pump feeds too much oil when the engine is operating at high speed, so that the crankcase fills up and the engine is over-lubricated, unless the hand pump is operated, which forces some of the oil back to the tank through a bypass without going to the engine.

Harroun's Novel Carbureter

One of the outstanding features is that the Harroun carbureter, which is very large and has a big air hood with the pointed screen, is placed outside of the bonnet, and the carbureter adjustment takes the place of the hand throttle. The accelerator alone being used as a throttle. Brakes are operated by cables which are carried through copper tubes. The gasoline tank at the rear has a three-point support, being carried on a cross tube at the front and a trunnion at the rear—this to avoid strains and frame twisting.



Oil radiator which is fastened under the frame of the Rayfield

The exhaust gas is taken out in a massive webbed manifold on the exhaust side, carried between the cylinders around the base of the carbureter and thence outward. **Isotta Altered in Appearance**

Gilhooley's Issotta is the same one that Tetzlaff drove last year, but it has had a number of alterations, the most noticeable of which is the streamlining of the body. There are two exhausts and two inlet valves in each cylinder operated by a camshaft above the cylinder heads. Pistons are of pressed steel and are very light. The motor is a four-cylinder block casting and the combustion space is nearly hemispherical and the valves are inclined slightly outward. Immediately above the camshaft is the hollow shaft carrying the sixteen-rocker arms for operating the valves. The whole mechanism is inclosed in an aluminum plate and pressure oil feed is used direct through the hollow rocker arm shaft and thus to the rocker arm. The camshaft runs in an oil level supplied in the rocker arm shaft. The connecting rods are tubular. The car is fitted with two sets of brakes, all internal, and one set on the front wheels connected up with the emergency brake lever and the other on the rear wheels connected with the pedal. The expanders are faced with cast iron.

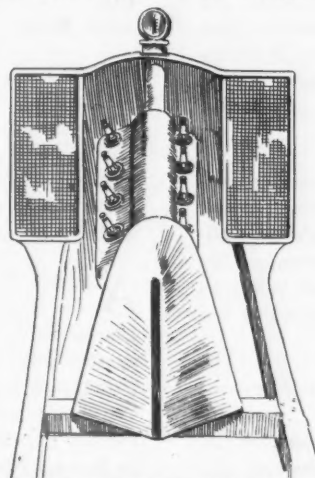
There are four cars entered which employ the Dusenbergs motor, these are the two Dusenbergs, driven by Rickenbacher and Haupt; the Mason, driven by George Mason, and the Chandler's Braender Bulldog. The first three are alike in practically every respect and simply are refinements of the Masons, which have made such a showing within the past few years. The valves extend horizontally into the side of the cylinder, the push rod working in and out instead of up and down. The valves and rocker arms are covered by an aluminum housing which makes the valve side of the block casting a smooth surface. The valves are operated by vertical rocker arms or walking beams whose lower ends bear on the side of the cams. The valves open directly into the explosion chamber so that there are no valve pockets.

The intake manifold is integral with the cylinder casting and the exhaust casting is directly upward through the top of the cylinders through a sheet metal header, open at both ends on the Mason, while the Dusenbergs have separate exhaust pipes carried out of the hood. The lower end of the inlet passages are cast as a part of the crankcase, on the upper end as a part of the block casting. The valve operating mechanism is lubricated by pumping oil through the hollow rocker arm shaft to the cams and bearings. The cars have turtle backs and a sharp nose.

Braender Bulldog Mulford's Product

The Bulldog, called the Braender Bulldog, is entered by the maker of Braender tires, but was designed by Ralph Mulford and built by Mulford and Chandler, who is to drive it. Its motor is a 350-cubic inch Dusenbergs and it is a very sturdy and well-designed appearing car. The radiator is about 4 feet high by less than half as wide and has a visor at the top. The bonnet ends at the rear in a cowl that almost conceals the driver and the mechanic.

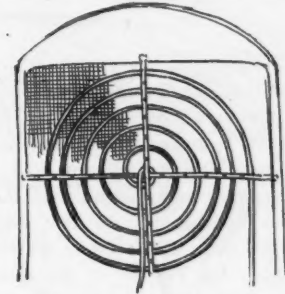
The streamline idea was carried out very thoroughly, the body being made by William Woop, New York, whose son, Charles Woop, is Chandler's mechanic on his car. Young Woop was so anxious that the car would make a good appearance



Front view of Rayfield with hood removed, showing the double set of plugs, one set upright and the other inclined

upon its arrival at the speedway that he spent the entire time of the journey from New York in the express car painting his pet. Both cowl and back are so high that the car could turn over completely without injuring the driver or mechanic.

The springs are very flat semi-elliptics and pistons and connecting rods are very light. Cable brakes are used, the trans-



Coiled oil radiator behind the water cooler on the Shambaugh

mission is a Brown-Lipe and the axle is a Timken. Chandler carries 40 gallons of gasoline and 15 gallons of oil, sufficient to carry him 400 miles. The car, though it looks speedy, will probably not be driven to the limit as it is the intention of the Braender tire people to repeat on Mulford's record of last year of running the entire 500 miles on one set of tires, a triumph that probably would be worth more to them than winning first place.

Of the three Mercers entered, two are similar to those of last year. These cars are to be driven by Wishart and Bragg, while the third, to be driven by Pullen, is of different design. The old Mercers are T-head jobs with the two spark plugs per cylinder. The magneto is set transversely on the crankcase directly behind the radiator. The intake header is of the ram's-horn type and the carbureter is attached to it by an extremely short pipe, in fact the carbureter feeds almost directly into the header.

The Three Mercers

Both Wishart's and Bragg's cars are the same in every particular, the bore and stroke being 4.8 by 6.2 inches, the cylinders are cast in pairs, and have 3-inch valves and a 7-16-inch lift. Both use Bosch magnetos with double distributors, and a Rayfield carbureter. The wheelbase of these Mercers is 112 inches, the gear ratio is 2¼ to 1 and they will be equipped with Rudge Whitworth wheels, Palmer cord tires.

The third Mercer, to be driven by Pullen, is the design of Engineer and is strongly reminiscent of that that ran second at Elgin last year with an L-head motor on 4 inches. It is a doubt

inches in lift. The wheelbase is

(Continued on Page



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The 500-Mile Sweepstakes

AMERICA and Europe are about to renew their ancient feud in the arena of sport. At 10 o'clock Saturday morning thirty racing motor cars will sound an impetuous and strident challenge and for 6 and a fraction hours of the May day, the Indianapolis speedway will resound with the roar of international strife. Champions of the old and new worlds will match strength and courage for fame and fortune in the fourth annual international sweepstakes; the fastest of the speed creations of America and Europe will thunder over the red bricks in the most spectacular 500-mile race ever held on the historic oval of flight.

AMERICA enters the lists with a lust for revenge. Europe answers the call of the speed gods determined to duplicate the triumph of 1913, when Napoleonic blue Peugeot, driven by Jules Goux, of France, roared its defiance to the defenders of America's speed prestige and swept across the line a decisive victor. America and Europe each will give her best in order to win. Saturday's victor will have reason to flush with pride when the checkered flag falls. The 500-mile race of 1914 will be the test supreme for man and machine.

THE invasion of the foreign champions has fired American patriotism and spurred American ambition, with the result that America is prepared to answer the challenge of France, Belgium, England and Germany. America's champions will be at the wire Saturday ready to fight the invaders hood to hood and wheel to wheel. American motor car designers and engineers have built faster, more dependable cars to shake off the challenge of Europe and revenge the defeat of the Mercer and Stutz in the 500-mile race of 1913. Goux's victory of 1913 was not crushing. America, humbled last year, will come back stronger than ever this year and will race for revenge until the last bolt and ultimate nut gives way.

WITH fine weather prevailing and barring accidents there will by sundown next Saturday be a new world's record for the 500-mile mark, a faster record and made with smaller cars than have raced on the Hoosier oval in previous years. The qualifying or eliminating trials have proven that speed is not solely dependent on mere cylinder diameter or piston stroke, but that there are many other factors as vital, if not more so, than these. The smaller motor is going faster this year than the larger ones did a year ago. With smaller motors, lighter chassis and better metals there should be less tire trouble and higher sustained speeds.

TURDAY'S race gives little promise of being a racing accident in which some driver will fall into the money through fortune of others. There are too many cars of well-liber to permit of such situations as that arising. The best to the combination of driver and car best suited to and the car built of metals capable of withstanding the strain that comes at such high speeds.

such fine workmanship in racing motors
the foreign and domestic
for show but for
have made pistons that are
design is concerned and have got light
added strength in ways never before seen in this

country. The matter of balancing the motor has received more attention than heretofore, metals are better than in former years, and the strength of all parts entering into the makeup of the motors are better than ever before. It can be said truly that so far as the foreign entries and some of the domestic ones that great progress in motors has been made within the last 2 years, and those concerns which expect to take up racing and meet with immediate success will reap a harvest of bitter disappointment.

THE racing cars are today coming back to not a few of the principles of gasoline engine construction laid down by gas engine leaders years ago but not followed out very consistently during the past few years. One of these has been the spherical combustion chamber, and while the present lot of valve-in-the-head motors do not all use this shape of combustion chamber, nevertheless it is a fact that they have a much more nearly spherical combustion chamber than in the T-head or L-head designs. These shapes of combustion chamber in conjunction with four valves per cylinder are making it possible to get a good mixture into the cylinders at high speed and also to get good scavenging on the exhaust stroke.

ADDED power is being obtained by the two-spark magneto; that is, the magneto with two distributors which gives two sparks in synchronism in each cylinder. Two sparks in synchronism gives a quicker propagation of the flame through the mixture, and a sharper and more powerful explosion. While the majority are using magnetos of this type, there are a few that are using two magnetos, delivering two sparks in each cylinder at the same time or as near the same time as possible, but this is not so satisfactory as the two-spark system because it is impossible to synchronize the two magnetos so well as with the double-distributor design.

MORE attention is being given this year to balancing the cars on the speedway than in former years. It generally is acknowledged that the best balance for a racing car is with equal weight carried over front and rear axles, but close students of the speedway are in favor of a little more weight over the front axle, this resulting in a car that holds the track better on the turns and so avoids skidding and consequent heavy tire wear.

THE Indianapolis speedway still has a great many lessons to teach our manufacturers and it is to be regretted that so few of them are on hand to enter cars and take advantage of the opportunities offered. Speed has yet many unwritten chapters of improvement and even for the maker who does not expect to build racing machines there are lessons that he can make use of in bringing out his passenger cars.

AMERICA is poorly represented in the coming race. True, three or four makers have gone into the work in a whole-hearted manner, but for each one that has approached the subject in this way there are two other entrants that are poorly prepared, and have not cars fast enough to be factors in the race. There are too many old cars, cars that amateur sports have secured and who have fond hopes that by some unexpected turns in fortune they might finish within the money. More big makers are needed in motor racing, and their presence will help the entire motor car industry.

Patron of Speed and Originator of Lincoln Highway



CARL FISHER Speedway Builder

A LAUGH of derision was responsible for the construction of the Indianapolis motor speedway on which the champions of America and Europe will meet Saturday to decide the question of international speed supremacy. A shrug of contempt made Carl G. Fisher of Indianapolis, the peer of the Roman emperors whose circus maximus of 2,000 years ago would be lost if placed within the colossal oval where Ben-Hurs of the twentieth century drive to fame with steeds of steel.

The laugh of derision came from French throats. French shoulders supplied the shrug of contempt. Both laugh and shrug were justified, but, at the same time, most galling. It was at Clermont-Ferrand, France, that Fisher's ire was aroused and his patriotism fired. July 5, 1905, was the day on which this resourceful Hoosier became obsessed with a great and praiseworthy ambition, an ambition to make American motor cars' mechanisms to be respected and feared in competition instead of rattling, unreliable mechanical snails that were then the butt of all Europe's ridicule.

Relief in the Gordon Bennett

Fisher sat in the pits while the sixth race for the Gordon Bennett cup was being run. As a relief driver for Bert Dingley and Herbert Lytle, he had crossed the Atlantic to have his pride humbled and his hopes shattered when one Pope-Toledo was eliminated early in the contest and the other finished last, and to hear the jeers of a jubilant French throng as the American cars limped around the course. Fisher's heart was in those cars. He had worked on them, tested them, driven them. Before the race he was confident that they would be serious contenders. Ten minutes after the start, he knew that they were hopeless pretenders.

Compared with the Richard-Brasiers and de Dietrichs of France, the Fiats of Italy and the Mercedes of Germany, the American defenders were the very epitome of slowness and inefficiency. On the turns—there were more than 400 on the tortuous, sinuous course—and in the mountains, where snow was banked on either side of the road, the crude carbureters refused to function properly. The Pope-Toledos never had been worked out on curves, the testing having been confined solely to a 3-mile straightway near the factory, where the drivers practiced secretly to outwit antagonistic police officials. Dingley and Lytle had no way to regulate the fuel mixture except to stop, raise the hoods of their machines and make carbureter adjustments direct. The French drivers, on the other hand, had only to turn a switch on the dash to get more or less air.

Poor carburetion was only one of many faults in the Pope-Toledos that Fisher noted as he watched the pitiful attempts of Lytle and Dingley to give Thery, Nazaro, Cagno and Callois anything that remotely resembled a challenge. When the stands ridiculed the Americans, he clenched his fists and gritted his teeth.

"They wasted money when they sent me over here," he thought. "America

don't need drivers. What we need are cars and a place to prepare them for such a race as this."

Interests Others in Speedway

Determined to make America a power in international motor car contests, Fisher returned to Indianapolis and immediately formulated plans for the building of a track on which motor car manufacturers might learn the A-B-Cs of design and construction. Fisher knew that the lessons taught by racing were invaluable. He had been a driver of gasoline-propelled vehicles from the very dawn of the sport, when the preparing of a car for a race was a tedious and Herculean task and often futile. He interested three other Indianapolis capitalists—J. A. Allison, his partner in the Prest-O-Lite Co.; F. H. Wheeler, the carbureter manufacturer, and A. C. Newby, builder of the National car and in the heyday of the bicycle, maker of Diamond chains—in his novel project to construct a speedway on the outskirts of the Indiana metropolis and with them formed a close corporation to finance the undertaking.

Three hundred and fifty acres of the most fertile land in the state, the Presley farm situated 3½ miles northwest of the city, were purchased as a site of the mod-

ern circus maximus, and early in the spring of 1909, work was started on the first and only speedway on the western hemisphere. Shovels in the hands of laborers became magic wands. Under the direct supervision of Fisher, the fields, where bumper crops of corn and wheat formerly had grown, were prepared for the reaping of world's records. A 2½-mile track, with banked turns, was constructed of macadam. Monster grandstands, garages, a large aerodrome, aviation sheds and office buildings were erected. Four miles of fence were necessary to inclose the plant. When the speedway was ready for its formal dedication in August, 1909, \$460,000 had been expended.

The first meet held on the new track was a costly project. After 3 days of racing, which attracted 80,000 spectators to the speedway, the course was an oval of deep furrows. The macadam had failed to withstand the punishment inflicted upon it by fifty or more racing cars running over it at record-breaking speed. A new surface was imperative if another contest was to be held there and Fisher and his associates stoically assessed themselves \$180,000 to defray the expense of reconstructing the track with vitrified brick and cement.

Polish Track with Cement Blocks

When the 3,500,000 bricks had been laid, it was discovered that the track was too rough to permit of high-speed work. Polishing was necessary to eliminate the outcroppings of cement, resulting from brushing, that cut tires to pieces after four circuits of the oval. After bids for this work were submitted by makers of electric polishers and scarifiers, Fisher decided that the expense was almost prohibitive. He therefore devised a plan for polishing the track that cost only \$800. Hitching heavy cement blocks to a flotilla of test cars, he dragged them over the rough oval for 3 weeks. At the end of that time the track was as smooth as glass.

Another meet was held in the summer of 1910 and then Fisher conceived the idea of an international 500-mile race to be run annually. The contests of 1909 and 1910 had been over shorter distances and he wished to promote a contest that would put the cars to a more rigorous test. Ignoring the adage that warns us not to put all our eggs in one basket, Fisher proposed one race a year for the largest purse ever offered for a motor car contest and promptly put into execution such a plan, a plan that has met with popular favor, as the box office receipts for the past 3 years will show.

As the scene of only one race a year, the speedway is a most unique business proposition. The four stockholders in the corporation realize on their enormous investment but 1 day out of every 365. The annual receipts for 5 years have averaged \$200,000, but the first dividend has yet to be declared. It is estimated that at the present time Fisher, Allison, Wheeler and Newby have \$800,000 tied up in this pro-

ject, a sum which includes the initial cost of construction and the expense of the many improvements that have been made within the last 4 years.

The motive that prompted the building of the speedway was the motive of the gentleman sportsman. Although an astute business man, Carl Fisher did not construct the speedway or promote the 500-mile race to realize directly on his investment. His main objects in each of these undertakings was to encourage the manufacture of more reliable motor cars, to teach lessons in races by which builders have profited in the design and construction of touring cars, to make the gasoline-propelled vehicle more dependable and concomitantly more popular. The speedway and the 500-mile race were only the means to an end much desired by him and profitable for him since the increased demand for motor cars has resulted in an increased demand for the accessories which he manufactures, lighting and starting systems. Fisher's associates in the speedway have profited in the same indirect manner as he—Allison, by the increased demand for Prest-O-Lite systems; Newby, through the disposal of more National cars; Wheeler, from a constantly growing market for carbureters.

That Fisher is sincere in his attempts to teach lessons by the promotion of the 500-mile race is evidenced by his attack on the use of castor oil as a lubricant and his reasons for that attack. His ultimatum against its use in the 1914 contest, rescinded last week, will stand next year.

"The use of castor oil teaches no lesson to the owner of a stock car because its cost is too prohibitive to permit of its general adoption," he told the writer recently. "The average motorist will not pay \$1 a quart for a lubricant. Next year we are going to reduce the piston displacement from 450 to 350 cubic inches. We already have shown the public that 450-inch motors are as fast and dependable as 600-inch motors and a similar lesson will be taught in next year's race. We may increase the size of the purse. We want to get the foreigners over here. They can teach us a lot about building motor cars."

Father of Many Projects

Carl Fisher is one of the most picturesque stars in the motoring firmament. As a promoter of things worth while, he holds the world's championship. In his brain have been born several ideas that have developed into wonderful projects through his tireless energy and masterly direction. He is the father of the speedway, the 500-mile race, the Lincoln highway and the horseless city. Had he lived in the age of fairies, he would have worn the seven-league boots. Speedy locomotion is his hobby. He has experimented with every device that has been made to carry man over the most ground or water in the least time.

In his youth, the speedway builder con-

centrated his athletic activities on skating. He raced on both ice and roller skates. He designed and manufactured the skates which he used in contests and by the publicity and prestige gained through victories, he boosted the sale of his products. With the coming of the bicycle, he switched his allegiance from skates to the two-wheeled vehicle. Again he made sport and business affinities, riding in races the make of bicycle for which he acted as agent.

"I never was a champion," he declared, "although I've taken the dust of the best of them—Eddie Bald, Earl Cooper, Fred Titus and Arthur Zimmerman. I was only a second-rater, but I made money at the game and designed, manufactured and sold the wheel that I rode."

Imported DeDion Motor Tricycle

Fisher became an enthusiastic convert of the gasoline-driven vehicle in 1898, when he purchased at a cost of \$650 the second motor tricycle that the DeDion factory imported into this country. It had a 2½ horsepower engine and wire wheels. The gears were open and exposed and at the conclusion of each race, Fisher had a polka-dot makeup. Lubrication was made en route by the acrobat-driver who carried a small can of grease and a paddle, with which to oil the gears, as part of his racing equipment.

Fisher's brother also bought a motor-cycle and the two traveled during the summer throughout the west and south, giving exhibition races at county fairs. At a contest held at Osgood, Ind., the crowds swarmed out on the course and almost stopped the race. In an attempt to clear a way through the astounded spectators, Fisher ran into two empty coal oil barrels, wrecking his machine and upsetting two pairs of rural lovers who had sought a place of vantage on top of the barrels.

After the accident, the victims invited Fisher and his brother to take dinner with them. Although one of the girls suffered a broken arm and the others appeared swathed in bandages, they did not sue for damages but thanked their guest for running over them. In those days bruises and fractures sustained in a collision with a motor-driven vehicle were regarded as marks of distinction and caused much envy among those less fortunate or unfortunate, whichever way you look at it.

In 1901, Fisher made his debut as a motor car speed king at a county fair at Dallas, Tex. He was matched to meet sixteen running horses in a 1-mile race, two bang-tails to run an eighth of a mile each. Fisher's machine was the first racing car that Alexander Winton turned out. It was lighter than the stock model and had a 1-inch longer stroke and ½-inch bigger bore. Its best time was a mile in 1 minute 43 seconds and as a freak, it was a greater attraction than

the bearded woman or the two-headed calf.

The morning of the race, Fisher found that there was no gasoline to be had in Dallas and he was forced to accept as a substitute the worst kind of coal oil adulterated with paraffine. It took him 30 minutes to get his car ready to start, as he had to heat the head of the cylinder with a blow torch to vaporize the heavy fuel. That first race at Dallas can best be described as a chaos. The initial pop of the exhaust was a signal for a general stampede. The horses on the track bucked and snorted with fright. The horses inside the track ran wild, overturning wagons and scattering men and women all over the grounds. There was some talk of a lynching bee as Fisher was beating it for the state line.

But Carl Fisher is anything if not persistent. He continued to pit his Winton against race horses in exhibition events held at fairs conducted by the Benevolent and Protective Order of Elks at that time. His summer campaign of 1901 was a tremendous financial success. He charged from \$600 to \$1,500 for each exhibition. After driving in the race, he took modern adventurers around the track at \$10 per mile and often cleaned up as much as \$250 in one afternoon. Although his rates were exceedingly high, he never ran foul of the interstate commerce commission. When the first snow of winter fell and Fisher put the exhausted Winton into winter quarters, he checked up with his banker and found that he had cleared \$20,000 as a county fair freak and barn-stormer.

Motor Car Agent in 1900

After another summer of exhibition races equally as profitable, he took the Indiana state agency for the Oldsmobile and Winton. He was no tyro at selling cars. He had been agent for the Mobile steam wagon in 1900 and was regarded as a pioneer when it came to selling horseless carriages. He discarded his one-lung Winton for an eight-cylinder Premier, the first car in America to have a magnet and the second eight-cylinder machine to be built in this country. He formed an alliance with Walter Winchester, tamer of an antique Franklin; Earl Kiser, master of the Winton Bullet; Barney Oldfield and Tom Cooper, who were experimenting with two of Henry Ford's creations; and Louis Chevrolet, one of the first of the foreigners to drive in this country, and promoted dirt track meets and drove in races all over the United States. He went through the fence twice, but escaped serious injury. After participating in a contest, he would circulate among the crowd in search of gullible prospects.

"I'd give them a thrill and then operate on their bank rolls," he said. "The sport was new and the interest in motor car racing was keen. I couldn't lose. Fifteen thousand was a big crowd in

those days. Times have changed. It takes 15,000 lemonade peddlers, peanut vendors, program pirates and newspaper men to run a race meet today. What's worse, they all get in free. The 15,000 of 11 years ago paid at the gate."

Fisher drove his last race in 1905. With the money he made as a bicycle and motor car agent and his rake-off from dirt track campaigns, he got control of an illuminating system and started the Prest-O-Lite Co. Incidentally, he laid a foundation for a fortune that today is estimated at \$4,000,000.

Becomes Convert to Balloon

But Carl Fisher had to have a substitute for the racing car which he had spurned. He became an enthusiast over ballooning and took to the air where there were no fences to crash into. In his monster gas bag, Indiana, he started from Indianapolis in the international balloon races of 1909 and sailed for 47 hours before he alighted in Georgia. He didn't have to come to earth. He just wanted to. He hadn't smoked for 2 days. He burnt up two cigars, soared aloft once more, landed in Tennessee and established a world's endurance record. The record was not allowed, however. The two cigars cost him the title of international champion. But he says that the price he paid for the smoke was ridiculously cheap. No doubt it was. As a suitor of Lady Nicotine, Carl Fisher is in a class with General Grant. One reason he hates to die is because he'll leave "so many good cigars behind for a lot of boobs that don't appreciate them."

The speedway builder also can qualify as a near aviator. Two years ago he built a biplane and attempted a number of flights in it. He succeeded in hurdling several fences that obstructed his right-of-way, but never got far enough off the ground to dispute any of the altitude records held by Beachey and the Wrights. The machine is now accumulating a covering of dust and rust in the huge aerodrome at the speedway.

As a driver of motor boats, Fisher has gained national fame. Two or three years ago he was a victorious contender in several of the western regattas with the Eff with which he won the feature event of the Cadillagua celebration at Detroit in 1912. He recently disposed of the Eff and the other craft in his flotilla, but he has two speed boats and one hydroplane building for use at his summer residence near Miami, Fla.

Just to prove his athletic versatility, Fisher goes in for deep sea fishing and talks nonchalantly of spearing a ton of tarpon, red snapper and muskellunge in the short space of an afternoon. Among the semi-savage negroes of the islands off the coast of Florida he is king of the barbeque. He cruises to their haunts, eats the wild hogs that the natives slay and cook for him and his guests, dances

through the night in century-old houses to weird and barbaric music.

The motor car is Carl Fisher's fetish. He always has had unbounded faith in its possibilities. When he stuttered around the dirt tracks in his one-lung Winton, he saw in the dust a vision of the modern touring car, a mechanism of stamina, power and refinement. It was such faith that brought about the conception and promotion of the Lincoln highway, a patriotic project that will be associated with the name of Carl Fisher long after the speedway stands rot away and the bricks of the red oval are no more. A decade ago he prophesied that the motor car would be a vehicle of transcontinental travel with the improvement of the country's highways, and 2 years ago organized the association that is linking New York to San Francisco with a concrete boulevard. With Carl Fisher behind the project, the Lincoln highway has been changed from a dream to a reality. Millions of dollars have been subscribed for its construction, the route has been logged and marked and hundreds of miles of road have been improved within the past 2 years.

"It never will be finished," Fisher declares. "Future generations always will be working on it. The completion of one improvement will only mark the beginning of another. It is a labor for all time."

"No Horses Admitted"

Speedway, the horseless city, is another of Fisher's projects which sprang into being because its progenitor believed in the future of the motor car. In his brain he conceived a settlement near Indianapolis where the motor car and accessory manufacturing activities could be centered and where horses would be barred. It was a feasible idea. He started to build such a city. He backed it with his capital and his energy. It is a reality today.

Carl Fisher is a bon vivant of the right sort. He has found life very, very good. He is a connoisseur of foods and tobacco. At smoking a cigar, he is an artiste. He seems to relish each puff. He loves to travel at high-speed. He drives his cars on the country around Indianapolis as if he were out after records. His foot is always on the throttle.

The speedway builder sincerely believes that he owes the world much in return for what it has given him. For that reason he is a booster—a booster for his city, his state and his country.

Fastidious in dress, a trifle eccentric, exceedingly foresighted and a player of the game for the love of the game, Carl G. Fisher has done much for motoring in America. The speedway is a monument to his energy; the 500-mile race a tribute to his patriotism. He is a resourceful man who sees far into the future through the tortoise-rimmed glasses that he wears and the future of the motor car will be all the better because of his seeing.

Patent Suits Are Numerous in the Eastern Law Courts

Klaxon Figures in Several Decisions—Rim Case On

NEW YORK, May 25—Several decisions in patent suits have been rendered during the past week.

Final decree in favor of the plaintiff has been issued in the case of the Lovell-McConnell Mfg. Co. against the Salvini Electric Horn Mfg. Co., Inc., by Judge Hand in the United States district court of the southern district of New York. The defendant assented to the granting of a perpetual injunction in favor of the Lovell-McConnell Mfg. Co. and waived the right to appeal the case, while the plaintiff waived all question of costs, damages and profits resulting from the infringement of its patents Nos. 923,048, 923,049 and 923,122. The board of directors of the Salvini company sanctioned the arrangement. The order was signed by Judge Hand.

A similar settlement was made in the case of the Lovell-McConnell Mfg. Co. against the Square Motor Horn Co., the court issuing a perpetual injunction in favor of the former who agreed to waive all question of costs, profits and damages in connection with the infringements of its patents by the Square Horn Co., and the board of directors of the latter company assented to the granting of the perpetual injunction against further infringement.

In the case of the Parsons Non-Skid Co. versus the Leather Tire Goods Co. in the United States district court for the southern district of New York, Judge Mayer has granted a preliminary injunction on default following a motion for the same by the Parsons Non-Skid Co. The plaintiff charges infringement of the Parson's patent No. 723,999 covering the well-known Weed chain tire grip construction.

In the case of the Motor Car Equipment Co., against William Wooster, trading under the name of the Auto Surplus Stock Syndicate, Judge Mayer, sitting in the United States district court for the southern district of New York, has ordered the Motor Car Equipment Co., to collect damages and all profits accruing to the defendant from its infringement of the patent covering the Kantelever emergency spring repairer. The case has been referred to W. H. K. Davey as master to ascertain and report on the amount of damages and profits of the defendant resulting from the infringement of the Dudley Pierce Power patent No. 902,250 granted October 27, 1908, and owned by the plaintiff.

RIM PATENT SUIT FILED

Cleveland, O., May 25—The Standard Welding Co. has brought an infringement suit under the John Baker patent No. 707538, against Brown & Davis, Cleveland distributors of the product of the Allen Motor Car Co. of Fostoria, O. This suit is based solely on the use of transversely split rims, manufactured by the Jackson

Rim Co., as used by the Allen Motor Car Co. in contravention of the claims 3 and 4 of the patent. The suit is being prosecuted in the United States district court, eastern division, northern Ohio. The John Baker patent is claimed by the Standard Welding Co. to dominate practically every form of transversely split rim at present on the market.

SPARK PLUG SUIT STARTED

Cleveland, O., May 25—In equity action brought by the Frontier Specialty Co. of Buffalo, N. Y., against the K-W. Ignition Co. of Cleveland, infringement on two patents for spark plugs is charged. The Frontier, by William J. White, president, alleges patents Nos. 642167 and 915896 were granted to John G. Shea of Detroit, the latter patent having been granted March 23, 1909. Infringement on features of the spark plug is alleged and the value of these features is set at more than \$20,000. Action was brought in United States district court, Judge W. L. Day, and hearing will be set soon.

KLAXON DENIED INJUNCTION

Detroit, May 27—A temporary injunction was denied the Lovell-McConnell Co. maker of Klaxon horns, which brought suit against the Sparks-Withington Co., of Jackson, Mich., and the Hudson Motor Car Co. here, the former the maker and the latter a user of Sparton horns which the plaintiff claimed to infringe on the Klaxon. Judge Arthur J. Tuttle, who heard the case declined to grant the temporary injunction because he was not thoroughly satisfied with the merits of the case and believed further litigation rather than an injunction to be the better course.

MARATHON RECEIVER DENIED

Nashville, Tenn., May 25—The application for a receiver for the Marathon Motor Works was heard last Friday. Evidence submitted showed that the assets of the company were greatly in excess of the liabilities so the application for a receiver was dismissed.

HACKETT TO MAKE STARTERS

Detroit, Mich., May 26—The American Electric Starter Co. has been organized by Mansell Hackett, head of the Disco company, which has been absorbed by the new concern. The company is capitalized at \$250,000 and has been incorporated by T. G. Murton, N. M. Guy and J. E. Olsen. It will make self-starters. A new single-unit machine having ignition starting and lighting functions, which has been designed by Joseph Lamb, will be marketed. The new company will supply the Krit, Paige-Detroit, Canadian Brockville-Atlas,

the successors of the American Atlas, and other concerns with its new self-starter and also will make starters for front attachment to Packards.

SEARCHLIGHT DENIED REHEARING

Chicago, May 26—A petition for a rehearing in the suit of the Prest-O-Lite Co. against the Searchlight Gas Co. of this city was overruled by the United States circuit court of appeals, Judges Baker, Seaman and Sanborn sitting. In a decision rendered recently the Searchlight company was prevented by the court from refilling Prest-O-Lite acetylene lighting tanks, the decision coming after about 3 years litigation.

APPLE NOT HANDICAPPED BY FIRE

Dayton, O., May 27—Special telegram—The machine shop of the Apple Electric Co. burned this morning, but this disaster will not upset deliveries in the least, says General Manager F. A. Cornell. "The stock rooms, shipping and service facilities and the office, including records, are untouched," he says. "With our unlimited resources all deliveries will be practically non-interrupted. Additional floor space has been secured."

FORD FIGHTS IN ENGLAND

London, May 22—The right of the Ford Motor Co. to fix the minimum price of Ford cars in England is again to be contested in the high court of justice. The Ford company this year obtained a court decision entitling it to say what was the lowest price at which its cars should be sold here; but the judges held that it had failed to prove the damage resulting from one of its London agents underselling others, although it was entitled to collect penalties for breach of contract on the part of the agents.

It is said that one of the chief causes of the litigation is the fact that certain English car manufacturers are endeavoring to check the Ford enterprise on this side, the large sale of Ford cars here having had a disastrous effect upon English sales, it is claimed.

Application was made today to the court of appeals for permission to reargue the case before three lords justice of appeal. This was allowed, and the Ford company received an extension of time to present its case.

SINGER WINS ENGLISH TEST

London, May 13—Nine cars finished with perfect scores in the Royal Automobile Club's annual light car trials, which closed Saturday after 6 days of strenuous driving and hill-climbing. Nineteen cars finished the run and of the nine un-

marked entrants, the Singer No. 22 was awarded the light car trophy and 200 guineas for the best all-around work. Following are the cars which made non-stop runs throughout the competition: G. W. K., three Swifts, Hillman, two Singers, a Standard and a Salmon.

WOOSTER BUYS P-S NAME

New York, May 25—If the plans of William Wooster, of the Auto Surplus Stock Syndicate, New York city, mature, it will be possible before the end of the summer to buy a Palmer-Singer car for about \$450. It will not be the luxurious creation which

has heretofore borne that name, but the name, nevertheless, will appear upon the vehicle.

Wooster, who is associated in business with his father, John Wooster, at 875 Seventh avenue, purchased the machinery and most of the stock and parts at the bankruptcy sale of the Palmer & Singer Mfg. Co., Long Island City, N. Y., Friday, and stated that he had plans to enter the car manufacturing business, building a small car with a Continental motor and other standard parts; he plans to enter the less-than-\$500 class. The name Palmer & Singer was included in his purchase.

The assets of the company brought between \$14,000 and \$15,000, which is slightly in excess of their actual appraised value. Wooster's bid amounted to \$10,101. The next largest buyer was a syndicate made up of Morris Frieders, New York; Henry Frank, New York; Theodore Friedenbergh, Manhattan Machinery Exchange, New York; Harry Benjamin, New York; John Nuttel, Philadelphia; and the New Jersey Machine Co., Newark, N. J. All are machinery jobbers. Their purchase consists of stock, parts and odds and ends of every description to the extent of about \$2,000. Junk dealers took an equal amount.

Speedway Race Brings Out Novel Engine Designs

(Continued from Page 27)

The Shambaugh, the entry that was marked as unknown, has a four-cylinder motor with two exhaust valves and one inlet valve per cylinder. These valves are located in the head and are operated by vertical push rods. The spark plugs are horizontally in the side of the cylinder and are operated by a single system, Bosch magneto. A feature of the Shambaugh is the oiling system. After the oil has been circulated through the motor it is sent out into what may be called an oil radiator. This radiator consists of a coil of copper tubing placed directly behind the ordinary water radiator. The draft of air rushing through cools the copper tubing and hence the oil therein, which is on its return passage to the motor crankcase. The cylinders are cast in pairs and each pair has a large copper waterjacket around it.

Piston Valve Motors to Show

The three Great Westerns, which have just arrived at Indianapolis, are featured by the Carter piston-valve motors. Two of the Great Westerns have the same dimensions, 4.2 by 8 inches bore and stroke, while the third has a 3.7 by 5.7-inch motor.

The total valve area of the 4.2 by 8-inch motors is equal to that of a poppet valve motor with 2-inch valves. In the Carter motor the valves are in the form of pistons which are similar to ordinary pistons, having rings and operating with a reciprocating motion. The piston valves are controlled by cams, but the camshaft is placed across the top of the cylinders. The valves are controlled as to opening and closing, by compression and suction and as they are opened and closed ports are uncovered and covered similarly as in a two-cycle engine. The details of the Carter piston valve motor were given in Motor Age issue of November 6, 1913.

The Great Westerns entered in the 500-mile race will use bronze bearings in the motor, a particular feature of these bearings being they are infused with graphite which has been found to offer exceptionally good lubrication; and prevent burning to a great extent. The large cars have a 2½ to 1 gear ratio and are equipped with 35

by 4½-inch Miller tires on Houck wire wheels. The small car entered uses 34 by 4-inch Miller tires on Houck wheels and the other features, such as gear ratio, bearings, metal, etc., being the same.

An Array of Talent

Horan's Metropol, which hails from Port Jefferson, has a four-cylinder T-head, block motor of 4.2 by 7.1 inches bore and stroke and is equipped with a Rayfield carbureter which has two gasoline lines leading to it. Very little attempt has been made at streamlining the car. The wheelbase is 110 inches.

The King car, that is driven by Klein, has a four-cylinder 5.1 by 5.5-inch motor with pair-cast cylinders. Three-inch valves are used with 9-16-inch lift. A Bosch double distributor magneto supplies current for two spark plugs per cylinder. One plug is located on each side of the T. The car is fitted with a 48-gallon gasoline tank, which feeds to a Rayfield carbureter. The oil capacity is 22 gallons. The wheelbase of the King is 112 inches and at the rear of the car the patented King cantilever springs are used. The gear ratio is 2 to 1. Present plans call for equipment of Rudge-Whitworth wire wheels, Empire tires, 33 by 4½ inches all around, and Hartford shock absorbers.

The Gray Fox, which did creditable work in last year's 500-mile race and which is to be driven by Wilcox, has a four-cylinder, 5 by 5½-inch valve in the head, Pope-Hartford motor. A Bosch double-distributor magneto will be used and also a Rayfield carbureter. The wheelbase is 96 inches and the gear ratio is 2.31 to 1.

The Ray seems to consist of a Mercer chassis with a Wisconsin motor of 5.1 by 5½ inches bore and stroke with T-head cylinders, cast in pairs. The magneto is a Mea with a double distributor and feeds through eight spark plugs. The valves have a 9-16-inch lift and are 3 inches in diameter. The Ray wheelbase is 108 inches and the gear ratio is undecided at this time.

Mort Roberts, who will drive the Pope Bullet, will handle a four-cylinder, 4.7 by 5.7-inch Pope-Hartford motor, with the valves set in the head. These valves have a diameter of 2½ inches and a lift of 9-16 inches. A double distributor Bosch magneto and a Rayfield carbureter will be used. The Pope Bullet has an unusually long wheelbase as compared with the other cars, it being 124 inches. There are two valves per cylinder, and the spark plugs are set at an angle.

The Texas, which hails from Fort Worth, Tex., is to be driven by George Clark. It is said to have made 105 miles an hour in practice. The cylinder dimensions are 5.1 by 5.5 with 3-inch valves and ¾-inch lift. The magneto is a Bosch with two distributors, and the carbureter is a Rayfield. The car has a 100-inch wheelbase, 2½ to 1 gear ratio and carries 35 gallons of gasoline and 15 gallons of oil, the latter being sufficient to carry him throughout the entire race, Clark believes. At present wire wheels and Miller tires, 35 by 5 all around, will be used, but this equipment has not been definitely decided upon.

One of the small cars in the race is the Stafford, to be driven by Callahan. With its bore and stroke of 4.2 by 5.1 shows a displacement of only 290.7 cubic inches. This motor, a four-cylinder one, is cast in pairs, and has the valves set on an angle of 30 degrees on each side. The water pump is in the rear of the over-head camshaft, which is driven by a silent chain; the latter also drives the magneto. As in the Keeton, the steering wheel of this car is braced. The wheelbase is 111 inches.

Dawson's Marmon

Dawson's Marmon, which has been entered by Charles Erbstein, a Chicago lawyer, is the same car which finished in fifth place in the 1911 500-mile race. It has a four-cylinder, 4½ by 7-inch T-head motor. This car has a Bosch double-distributor magneto, a Schebler carbureter, of 2-inch size. The valves are 2¼-inch in diameter and have ¾-inch lift. The wheelbase is 120 inches and the present gear ratio is 2 to 1.

Conditions in Syracuse, N. Y., Buffalo and Chicago

Franklin Doing 61 Per Cent Better Business Than Year Ago—Reports From Palmer-Moore and Chase Trucks—At Brown-Lipe Plant

SYRACUSE, N. Y., May 25—This city is one of the important links of the motor industry because of the location here of the Franklin factory, as well as being the home of the Palmer-Moore and Chase trucks. Here also are the Brown-Lipe-Chapin and Brown-Lipe companies. The outlook from the viewpoints of these several concerns is bright indeed.

H. H. Franklin, president of the Franklin company, states that from last October until April 30 of this year Franklin business was 61 per cent ahead of this period a year ago and that during the first 3 months of the present season production and shipments were 94 per cent in advance of last year.

This enormous increase in Franklin business is due to a variety of causes, among which must be considered the fact that the company has dropped its multi-model policy and this year is producing only one chassis, a six-cylinder air-cooled car, and is manufacturing it in large quantities.

The rise of the Franklin company to its present point of importance constitutes one of the most interesting chapters in motor car development in America. This company has been the one concern to draft a policy of its own and pursue it without deviation up to the present. The present Franklin is a development of the original air-cooled car developed by John Wilkinson, now vice-president of the company and for years chief engineer. On Mr. Wilkinson's shoulders has fallen the entire task involving the car of today, Mr. Franklin controlling the executive end of the business.

John Wilkinson's Ideas

While other concerns have been copying foreign designs, Mr. Wilkinson has been developing his original conceptions of what a motor car should be, namely, a light weight, flexible vehicle, operated at a minimum cost. To obtain this flexibility he started in 1902 with his wood frame, adopting this because of the fact that you cannot have strength in rigidity, but must have strength in flexibility. In his quest for flexibility he added to the wood frame the elliptic springs without radius rods, taking the precaution of incorporating plenty of metal in the springs. Mr. Wilkinson believes that side-sway is an essential in car flexibility. It saves the wheels, and it saves the tires. Strength is one of the greatest factors in flexibility, and it can be had with lighter weight when you employ a construction in which you distribute the strains not only over greater areas, but also over greater time periods or cycles.

Mr. Wilkinson employs the tubular front axle on the ground that it is lighter

By David Beecroft

and stronger than other types. He uses the six-cylinder car because he has lower shock stresses through the driving system of it, coupled with a possible greater flexibility in driving.

One of the most important factors in flexibility which Mr. Wilkinson has developed throughout his car is that of a nice balance among the different parts in his transmission system such as the chain of shafting starting with the crankshaft and including clutch shaft, gearset shaft, propeller shaft, rear axle pinion shaft, and axle drive shaft to the rear wheels.

Franklin Uses Taylor System

One of the factors in connection with his production of which Mr. Franklin is most proud is the complete Taylor system, which is in operation throughout the entire factory. This system, installed some years ago, has been worked out satisfactorily in every detail, and now is responsible for the greatly increased production which the factory has charged. One of the interesting aspects of this system on the chassis assembly floor is that on either side of the line of chassis going through assembly is a continuous line of crates and shelving on which are placed the different parts entering into the make-up of the chassis. In one crate are the tool boxes, in another the fenders, in another the battery trays, in another the wiring parts, etc. Each tray is located on that part of the floor where it is most convenient to the workmen, attaching this particular part to the chassis. With such an arrangement there is little if any waste of time on the part of workmen walking for material. This system is carried out to the finest detail in the manufacturing departments as well.

One of Mr. Franklin's chief works at present is that of developing what may be termed a closed touring car. Mr. Franklin is an all-year-round tourist and believes the eventual touring car will not be an open type vehicle as used today but rather a closed type, which, besides being suited to winter use, will have sufficient window space to give every comfort for summer touring. Such a vehicle must be light, free from noise, and with speed possibilities practically the same as the open car of today.

The Chase Motor Truck Co., builder of air and water-cooled motor delivery wagons and trucks, has been operating on schedule since its manufacturing year opened on October 1. The machine shop for the past 3 months has been operating until 10 o'clock at night. Last year this company manufactured 1,000 air-cooled de-

livery wagons, and during the recent New York show announced its line of water-cooled trucks, which have been particularly good sellers, comprising practically 50 per cent of the business of the company since brought out.

According to E. A. Kingsbury, general manager and secretary and treasurer of the company, from 254 to 275 men are now employed by this company. Business is a little slower at present than a year ago. During March and April there were two short business spurts.

Mr. Kingsbury disposes of its output through 450 dealers in America, and in addition has an export trade with South Africa, West Africa, Australia, Brazil, Mexico, etc. Of these dealers 75 per cent of them are exclusively engaged in merchandizing Chase trucks and the remainder of them handle these trucks in addition to passenger cars. Many of the truck dealers are also engaged in the implement business. In order to keep the retail force throughout the country in par selling conditions, the Chase company has fifteen district managers, who are constantly traveling throughout the territory, and Mr. Kingsbury visits all of his dealers once each year.

One good work accomplished by these district managers is that dealers keep up an adequate quota of supply parts, which is a most important factor in truck merchandising.

Good Business on Coast

In analyzing general conditions throughout America, Mr. Kingsbury considers the Pacific coast particularly good, such cities as Los Angeles, San Francisco, Seattle, Portland and Spokane not only having merchants able to buy trucks, but these merchants also are of the progressive type. Business in Chicago and vicinity is good.

C. L. Palmer, secretary and treasurer of the Palmer-Moore Co., builder of the Palmer-Moore 1,600 and 2,000-pound vehicle, states his company moved into its present plant in February, 1913, and started deliveries in May a year ago. The company is located in a factory with 47,900 square feet of floor area, and is employing seventy men at present. This company builds but one model and uses its three-cylinder two-cycle motor, which was developed by Edward Moore, chief engineer of the company. This motor is characterized by controls in the ports on both intake and exhaust sides, so that the carburetor is not regulated, but regulation effected manually by the ports. The company is at present putting out both air and water-cooled types, the water-cooled being in greater demand.

In looking over industrial conditions in

general, Mr. Palmer states that a year ago business started in fine shape and continued until the general slow-down in August, which extended itself well on to February. After that date considerable improvement was shown. This company has recently received one large order for twenty trucks from one company. Mr. Palmer says that the plant and land are entirely clear, and the company should consequently have good prospects for development.

Make Differentials and Gearsets

Two large Syracuse accessory plants are the Brown-Lipe-Chapin Gear Co., which manufactures nothing but bevel gear differentials for motor cars, and the Brown-Lipe Gear Co., located but a few blocks from this, which manufactures nothing but gearsets for motor cars and trucks, both factories being under the same management and controlled by General Manager Chapin. At present 1,000 men are working in the factory manufacturing differentials only, and 250 men in the factory manufacturing gearsets, etc. This number is slightly lower than a year ago, the company considering that general business at present approximately from 60 to 75 per cent of normal, this reduction being largely due to the slowness of the commercial motor vehicle field.

Last year was the biggest year in the

industry so far as this company was concerned, and a part of the slowness this year is due to some makers overstocking a year ago, and over-estimating the possibility of production for this season.

Conservative Trend Noted

The general financial conditions have made several of the motor car companies more conservative than a year ago. A characteristic of business this year has been ordering in smaller quantities than formerly, and orders being correspondingly more frequent. The company considers that present retrenchments are very natural and looks forward to a particularly big trade next year.

In the Brown-Lipe-Chapin factory, which is a modern factory, opened January, 1910, only bevel gear differentials are manufactured. In the Brown-Lipe factory only spur gear work is carried on, and it is restricted to gearsets, gearsets with clutch constructions and control parts, and gearsets to go with jackshafts and rear axles. The company builds gearsets exclusively to its own design and in sizes suited from anything to the light runabout to the 5 or 6-ton truck and with either three or four forward speeds. This company has been keeping abreast with the development of the industry so far as design and also manufacture is concerned.

The Dyneto Electric Co., which, during

the past year, was located in Syracuse, has largely confined its manufacturing activities to the Dyneto motor-generator, built on the Entz principle, for Franklin cars, is now ready to begin a new chapter in its manufacturing career in that A. E. Doman, vice-president and engineer of the company, has completed the development and testing of a series of three new combined motor-generator machines for motor car use. These are entirely different machines from the present dyneto and weigh but one-half as much. They are hexagon-shaped instruments, the smallest size weighing 30 pounds and being suited for cyclecar purposes; the intermediate one, weighing 45 pounds, is for cars with 4¼-inch cylinders and under; the large size, weighing 55 pounds, is suited for all sizes of cars, including four-cylinder and six-cylinder types. Mr. Doman, besides cutting the weight of these motor generators in half, claims to have as high motor pull, higher generating qualities, and with the ability to charge the battery at a slightly lower speed.

Dyneto Company Busy

The Dyneto company is at present located in a four-story building with 30,000 square feet of floor space. Sixty men are employed and it is expected to increase this to 100 when the manufacture of its new motor-generator is under way.

Industrial Situation as Seen by Colonel Charles Clifton

Pierce-Arrow Treasurer Talks—Outlook in Buffalo

BUFFALO, N. Y., May 25—The Bison City's claim on the motor industry is due to the location here of the Pierce-Arrow plant and the activity of several truck concerns and accessory companies.

Colonel Charles Clifton, treasurer of the Pierce-Arrow Motor Car Co., in a general survey of industrial conditions, not only immediately affecting the motor industry, but embracing the country in general, and, in fact, looking at things internationally, considers that the present 60 per cent capacity which the metal industry is operating pretty truly represents the industrial conditions not only in America, but in Canada, Europe and South America as well. Colonel Clifton considers that internationally the world is agog today and passing through an industrial crisis, not a financial crisis, such as experienced in 1873 and 1893. He attributes this condition generally to the fact that demand and supply are out of touch with each other; that, in other words, the natural law on political economy laid down by Adam Smith years ago is not operating as it should. He considers that production has decreased approximately 40 per cent, being only at 60 per cent of normal.

Going somewhat further, Colonel Clifton, by the way of analysis of the present industrial crisis, thinks that many countries have gone ahead too fast, that there has

been too much waste, and that many countries have not been actually making the money they imagined they were. There have been large wastes in government expenditures, heavy wastes in municipal expenditures, and a wave of greater expenditure has permeated the great masses of millions of inhabitants throughout this as well as other countries.

The Stewart Motor Corp., which began business in its present plant 1½ years ago, now is employing sixty-seven men and producing ten to twelve of its 1500-pound vehicles per week. In its present four-story brick factory with 77,000 square feet floor area, there is a capacity of 2,000 vehicles per year.

Good Commercial Outlook

T. R. Lippard, general manager of the company, states that 100 per cent. of the business is retail work, and that they are at present selling vehicles to sixty-five different lines of industry in the retail delivery field. The company has seventy-two dealers and has trucks operating in 100 different cities. In addition the export business is developing, twenty-one having been shipped to Buenos Ayres, South America and regular dealers handling them in such Canadian points as Montreal, Toronto, Ottawa, Winnipeg, Calgary, and Edmonton.

According to Mr. Lippard, the retail business is permeating practically every

line of industry today, some of the biggest users being concerns engaged in the following industries: laundry, bakery, plumbing, ice-cream, wholesale tobacco, millinery, hospitals, butchers, furniture, dyeing and cleaning, retail grocery, etc.

In analyzing the country industrially, Mr. Lippard reports New England as the best retail delivery market, and cites how smaller towns in Vermont and Maine are taking up motor delivery. The Pacific coast was good until last fall, when it experienced a heavy slump, but is now getting back into shape. The great Mississippi valley, west of Cleveland and east of the Rockies, is not so good. The best buying territory in the country is from the Cleveland line east.

For the first 4 months of this year the Stewart Motor Corp. is a little ahead of business for the corresponding months last year, but it has cost slightly more to secure this business. Heretofore the company has, during the 18 months of its existence, concentrated on establishing its entire distribution center over the country, and from this date forward is entering nationally into the selling field.

Mr. Lippard, in speaking of the sales, says that the majority of good salesmen for motor deliveries are obtained from other lines of business, some of the best coming from the hardware and furniture

lines. According to him the touring car salesman has been spoiled in that he has not been educated to go after business as he should, but has been more content to wait until it has come to him. Too many truck salesmen are today knocking the other make of truck instead of bolstering up the truck business in general. In this respect the truck makers of today are behind the passenger people, who, in the early days of their industry, accomplished much good by vieing with each other in various contests, which were good advertisements for the entire industry.

The Stewart Corp. sells its vehicles entirely on pneumatic tires, and because of this is practically free from maintenance troubles. Mr. Lippard states that with tires well inflated it is possible to get 5,000 miles. Mileage test was recently made on six delivery wagons in the service of a Buffalo daily paper, which averaged 6,227 miles per set of tires per truck. The total mileage of the six trucks follows: The first truck, 8,065 miles; second truck, 6,030 miles; third truck, 4,289 miles; fourth truck, 6,155 miles; fifth truck, 7,653 miles, and sixth truck, 5,172 miles. These trucks in service averaged 175 stops in 2 hours delivery work. These mileages give a fairly representative indication of the possible mileage from pneumatic tires when they are well looked after by keeping the inflation up and repairing the tread as needed.

According to H. H. Goodhart, sales manager of the Lippard-Stewart Motor Car Co., the worst problem of today in the merchandising of trucks is the dealer who takes the truck as a side issue, and devotes the majority of his efforts to marketing passenger cars, which offer a more ready market, and then gives the truck business the balance of his activity. This company is distributing its product to approximately forty-five different places, and has exclusive agents in three cities, in all of which the dealer is making a success of the business. Considering the country as a whole, 25 per cent of the company's business is repeat orders, but in some cities, notably Buffalo, this percentage is as high as 30.

Lippard-Stewart Activities

At present the Lippard-Stewart Co. is employing between fifty and sixty men and producing upwards of forty trucks per month. The company is located in a three-story brick building, with 50,000 square feet of factory space, having started business in this factory in 1911. The output at present is confined to two vehicles, the original 1,500-pound delivery wagon, with either worm or bevel axle, which constitutes 60 per cent of the output, and its new 1½-ton worm-driven truck brought out last September and constituting 40 per cent of the business. Mr. Goodhart considers worm-drive a large selling factor today.

One of the characteristics of the motor truck industry today is the wider distribution, due to such places as Sioux City,

Ia., not only actively taking up the truck business, but offering good possibilities. Among the largest consumers of trucks are furniture dealers, bottling concerns, transfer and cartage organizations, bakeries and wholesale grocers. The 1,500-pound vehicle finds a market with department stores, florists, who in general constitute a class well able to buy motor vehicles, retail grocery companies, milk dealers, etc. The factor pushing the retail grocer to buy trucks is that his rival using the motor is able to make as high as 200 stops a day and cover 120 miles, thus giving a quicker delivery service, which is a good factor with a housewife. The possibilities of the motor truck in the retail milk delivery recently demonstrated at Buffalo, where two one-horse wagons required from 2:30 a. m. to 11 a. m. to cover the delivery circuit, this circuit is now being covered between 2:30 and 8:30 a. m. by one motor.

At the Atterbury Plant

The Atterbury Motor Car Co., with its present factory force of ninety-two men, has a production schedule of approximately one truck a day, and shipped eight during the past week. J. R. Spraker, general manager of the company, states that over 60 per cent of the company's business is made up of repeat orders, and that 90 per cent of all the business is east of Chicago.

The Atterbury company can today be looked upon as an exponent of worm drive, having brought out its first worm-driven models last July, and is now marketing these in 1,500 pounds, 1-ton and 2-ton models. The company has a 3-ton chain-drive type, but expects to convert this into a worm-driven type in the near future.

Mr. Spraker states that the general demand throughout the country is for a medium-weight vehicle, preferably of 2 tons, and that it is easier to market such a vehicle at present than a 1,500-pound one, because the purchaser desiring a 2-ton type finds it easier to make an investment of this amount than does the smaller merchant who requires a 1,500-pound vehicle.

Referring to conditions generally throughout the country, Mr. Spraker reports conditions in New England generally good with the possible exception that many buyers in Boston and vicinity are wanting to buy on the time payment plan with one-third cash and the remainder in notes of 8 months or thereabouts. The demand for 2-ton trucks is very general throughout the industrial world, and such lines of industry as cartage concerns, wholesale grocers, department stores, biscuit and bakery companies, flour mills, etc., are among the leading buyers. One regrettable aspect of the motor truck sales of today is the foolish competition indulged in by several companies. Mr. Spraker cited several examples of where Atterbury trucks had been sold, and before delivery was made some rival salesman had attempted to get cancellation of the Atterbury order and the substitution of

their truck. In fact, this unfair rivalry in some cases extends still further, cases being on record where spies have been sent to some factories to note in the body-making department what companies bodies were being manufactured for. It is most unfortunate that such unnecessary competition is in existence. There is room for all the makers, and what they need is coöperation among themselves rather than injudicious, unbusiness-like methods of this nature. It is but natural that where such selling tactics are resorted to that price-cutting is sure to follow. This condition suggests the necessity of conventions among truck makers so that they will get together and see the folly of such selling methods.

The Atterbury company is located in a large factory with 250,000 square feet of floor space. It has its own extensive wood-making department for manufacturing all styles of bodies, and is at present engaged in entirely re-organizing its various factory departments. The company owns 4 acres of land on which the present factory is located and has every opportunity for advancement.

The Houk Mfg. Co. has at present manufacturing capacity for 1,000 wire wheels per day of 10 hours, but its ability to manufacture inner hubs is not up to this capacity, the production of inner hubs to meet the varying wheel requirements comprising one of the slowest factors in wire-wheel production.

Houk Company Operations

It was on September 23 last that George W. Houk purchased the present plant and 2 weeks later put an addition in the form of a second floor, 385 by 65, this addition being solely for assembling of wheels and the storage of rims and parts. This addition was completed by October 1, but before its completion delivery on wheels had already started. The company is regularly supplying wire wheels to thirty or forty different makers, and the business is increasing 33 per cent monthly.

The spokes in a wire wheel call for considerable care in that there are three different angles of bend used on the inner ends of the spokes, the bend depending upon the type of hub to be used as well as the diameter of the wheel. At present 102 different sizes of spokes are needed, and the company regularly carries in stock over 1,000,000 spokes, which are purchased from the Standard Co., Torrington, Conn., in boxes of 2,000 each.

The Fedders Mfg. Co., Buffalo, N. Y., with its force of 400 men, is at present manufacturing 200 radiators per day, and expects to increase its production from 40,000 radiators last year to 50,000 for 1914. The company is at present supplying radiators to thirty-five concerns in the motor car and motor truck industry and during the first 4 months of this year its business was 15 per cent greater than in any other 4 previous months in the history of the company.

That the company is following the gen-

eral trend of greater economic production is proven by the fact that today with fewer men the factory is producing more radiators than a year ago. Louis Fedders, general manager of the company, has been responsible for many changes whereby the efficiency of the plant has been increased. Special machines have been designed for manufacturing the cooling portion of the radiator. There are forty machines which convert the sheets of copper into the necessary corrugated form to give a cellular structure. In addition are six large ma-

chines manufacturing square tubes for the cellular type radiator, each machine manufacturing from the sheet of copper sixty-five tubes per minute. It is these automatic machines, together with the fact that they are operating at higher speeds than heretofore, coupled with improvements in assembly and other factory operations that make production greater than in previous years.

The Fedders Mfg. Co. began business in 1897, manufacturing a general line of sheet metal goods, and it was not until 1902 that

the active manufacture of radiators was begun. Seven years ago the present four-story brick factory devoted exclusively to the manufacture of radiators was erected. This factory has been operating on schedule all winter and although there has not been any night work, it has been necessary to work 3 hours longer each day. Throughout the factory improved systems of automatic carriers have been installed and in other places the radiators and radiator parts are conveyed from upper to lower floors through gravity shutles.

Chicago Concerns Find Business Outlook Good

Accessory Manufacturers Report Plants Busy

CHICAGO, May 25—While this city is the great distributing center of the motor industry, still it does not rank among the leaders as a car manufacturing proposition. However, Chicago houses several big concerns which figure most prominently as makers of accessories. Notably among these are the Stewart-Warner Speedometer Corp., making speedometers, vacuum gasoline systems, power pumps, etc.; the Stromberg Motor Devices Co. and the Findeisen & Kropf Mfg. Co., making Stromberg and Rayfield carbureters, respectively, and the Woods Motor Vehicle Co., making electric cars.

Stewart-Warner Report

Operating three plants—two in Chicago and one in Racine—the Stewart-Warner Speedometer Corp. is employing nearly 1,200 men, and so great is the demand for the company's product that at the present time the three plants are working overtime. They are up to capacity, so that it is impossible to add more men, hence night work is necessary to keep up with the demand. The main plant in Chicago—on Diversey avenue—covers 12 acres of ground, while the plant on Wells street utilizes four floors. The Racine plant employs 400 men.

"We are running to capacity and right now we are 25,000 orders behind," says General Manager C. B. Smith. "Our capacity ranges from 2,800 to 3,000 instruments a day, quite a contrast to when we first started in November, 1906, with ten workmen. Then we were doing a fine business when we turned out half a dozen a day. The spring business started 3 or 4 weeks late, but now it is on with a rush and hardly will let up until July 1. We work overtime and are running to capacity.

"Our export business shows surprising growth and we are selling 10,000 instruments in England alone. I should say that our export business has increased 25 per cent over that of a year ago.

"Business in our other lines is surprisingly brisk, too. We are making a vacuum gasoline system, which converts a pressure-fed system into gravity; we are making power tire pumps, a radiator meter and a

cream-separator speedometer. The vacuum system is making rapid strides and by June 1 we will be turning out from 500 to 600 a day. Already we have booked with several of the large car manufacturers for this device as part of their regular equipment for 1915.

"The power pump is coming in strong and I do not hesitate to predict that in 1916 it will be part of the equipment of every standard make of car. This year we are turning out 25,000 and the demand is growing. The power pump will go a long way toward winning more recruits to motoring, men who dread the back-breaking labor of pumping tires by hand and who heretofore have held aloof."

As an evidence of the progress it has made in the past year the Findeisen & Kropf Mfg. Co., maker of Rayfield carbureters, announces that 300 service stations have been established at important points in the United States in the last 12 months. A year ago the company did not have one, but the expansion of its business resulted in the establishment of this chain of stations to care for the users of Rayfield carbureters.

At the present time the factory is working to capacity and 300 carbureters a day is the output of the plant, keeping 400 workmen busy, whereas a year ago 300 were employed and the daily output was 175. The plant also has grown, or rather expanded. Within the year an additional 20,000 square feet of space was added, giving a total of 60,000.

"We have been running just 4 years now, so our present pace is most gratifying," says E. A. Bates, sales and advertising manager of the company. "Our business in this country has been uniformly good in all sections of the United States and I anticipate that 1914 will show an increase of about one-third over the business of 1913. We are doing a fine business in Europe, which we invaded during the past 12 months, and also we have gone into Australia with considerable success."

A new model G carbureter is about to make its debut and it will stand as an improvement over the dashpot type.

The April production of 10,000 carbu-

reters of the Stromberg Motor Devices Co. was almost a record month for that firm. It was exceeded by only one other month in the past 2 years and May promises to be even better. The factory has been running overtime for a month now and is right up to capacity. From 375 to 380 men are employed in the plant, 100 more than a year ago, and prospects are bright. The company expects to have two new models ready shortly in which some radical improvements have been made.

"The accessory concerns are working abnormally now because of the slack time the latter end of 1913," says C. W. Stiger, general manager. "That slack time was not their fault, either. Car manufacturers slowed their production for 3 months until the shows, when they were reassured. Then they went to manufacturing with a rush. They tried to take up the slack and in consequence the accessory concerns were called upon for supplies, and an effort was made to again get on a production schedule. Most of the makers have succeeded in this, but it has rushed everyone. I look for future conditions to be about the same as they were at this time last year."

Woods Running to Capacity

The factory of the Woods Motor Vehicle Co. is running to capacity now and business for the first 4 months of the present year has been 10 per cent better than in the same period last year. With the Woods company the record of sales indicates shipments. Considerable new territory has been developed of late, the Woods gaining in strength in Pittsburgh and also in Kansas and Oklahoma. Chicago, however, continues to be the stronghold of the electric industry. Here there are 4,000 machines in operation, it is estimated, more than any other city in the country can boast.

"Business in 1913 was fine up to July 1, then we noticed a slump," said L. E. Burr, president of the Woods company. "Then right after Christmas it picked up again suddenly and during the holidays we did an unusual business. There has been no letup and business has been good ever since."

Late News Happenings in the American Motor Industry

Gibson Customers Invade Overland Plant at Toledo

TOLEDO, O., May 25—It was an unusual and noteworthy event which took place in this city last week, when 200 purchasers of Overland cars from the state of Indiana came to Toledo in a body at the expense of the Gibson Automobile Co., of Indianapolis, state distributor for the Willys-Overland Co., and drove to their home in the adjoining state in as many new cars, just fresh from the factory.

The visitors hailed from nearly 200 Indiana towns and arrived in Toledo early Wednesday morning in special cars provided by the Gibson Automobile Co. They were received at the Willys-Overland factory and escorted through the immense plant. After luncheon there was a grand parade and moving pictures were taken of the visitors and cars. The cars then were parked in a downtown location where they were cared for by special policemen while the guests were entertained at dinner by the Willys-Overland Co. officials at the Commerce Club. Speeches were made by President J. N. Willys, Isaac Kinsey and others.

Before the dew was off the flowers Thursday morning the long procession of shining new cars representing a cash value of \$200,000, had started on the homeward journey. The affair was unique and the importance of the big factory and the immense business done was emphasized in a manner not to be forgotten by those who witnessed it. The various cities and towns represented by Overland purchasers were:

Indianapolis, Angola, Ashley, Bargersville, Berne, Bloomfield, Bloomington, Bluffton, Boswell, Bourbon, Brazel, Brook, Brownstown, Cambridge, Cayuga, Churubusco, Clinton, Cloverdale, Columbia City, Columbus, Connersville, Converse, Corydon, Crawfordsville, Crown Point, Cynthiana, Danville, Dunkirk, East Chicago, Ind., Elkhart, Elwood, Evansville, Fairbanks, Fairland, Farmland, Flora, Fort Wayne, Frankfort, Fulton, Garrett, Gary, Greensburg, Hagerstown, Hamlet, Hillsboro, Huntington, Jasonville, Jeffersonville, Judyville, Kendallville, Knightstown, Knox, Kokomo, LaCrosse, Ladoga, Lafayette, La Fontaine, La Grange, LaPorte, Lawrenceburg, Lebanon, Liberty, Linton, Logansport, Madison, Marion, Marshall, Martinsville, Medaryville, Michigan City, Middlebury, Middletown, Mitchell, Montezuma, Monticello, Monroeville, Muncie, New Albany, New Castle, Noblesville, North Manchester, North Vernon, Osgood, Otterbein, Pendleton, Peru, Plymouth, Portland, Princetown, Remington, Rensselaer, Richmond, Roanoke, Rochester, Rushville, Salem, Shipshewana, South Bend, Spencer, St. Joe, Sullivan, Terre Haute, Tipton, Topeka, Union City, Valparaiso, Vevay, Vincennes, Wabash, Wakarusa, Warren, Warsaw, Winamac, Indiana, Chicago, Louisville, Ky.

OVERLAND SAYS 75,000 IN 1915

Toledo, O., May 23—The Willys-Overland plant will shut down for inventory about June 13 and will reopen 2 weeks later for the 1915 season. It is the announced intention of the concern to turn out 75,000 cars during the season. The Willys-Overland company is now engaged on new buildings which will cost approximately a million dollars and it is stated that about 1,000 additional men will be

employed when these improvements have been completed.

The Willys-Overland Co., it is announced, has taken over the plant of the Kinsey Mfg. Co., which will in the future be operated as a department of the Willys-Overland plant. The stock of the Kinsey Mfg. Co. was owned almost entirely by the Willys-Overland and the merger has little meaning save the abolishment of the Kinsey company's office force. The Kinsey company was capitalized at \$100,000 and the officers were: President, Isaac Kinsey; vice-president, John N. Willys, president of the Willys-Overland Co.; secretary, Homer V. Hawk; treasurer, Walter Stewart. Under the new arrangement Mr. Kinsey and the other officials of the Kinsey Mfg. Co. will become a part of the official staff of the Willys-Overland Co. The Kinsey Mfg. Co. has been engaged in making parts of various kinds.

NEW COLE PLANT OPENED

Indianapolis, Ind., May 25—The new plant of the Cole Motor Car Co., on East Washington street, was officially opened this week. While only a \$225,000 section has been constructed to dovetail into another new addition at the corner of Market and Davidson streets, still the two buildings combined will enable Cole to increase factory production without jeopardizing quality.

The Cole plant has 275,000 square feet of floor space, approximately 6 acres of ground. The last new addition is 100 feet wide on the East Washington street side, 376 feet deep from East Washington to Market streets, and 132 feet frontage on Market street. There are 15,814 panes of prism glass in the fenestra sash,

exclusive of the offices. Over 500 tons of steel was used in the construction of the plant, and 13,000 tons of concrete. The floors throughout are of concrete. The latest type of construction is used in the employes' lockers and rest room, modern plumbing, steel clothes lockers, sanitary drinking fountains, plenty of ventilation all supersede the old type of factory with workmen's coats hanging on a nail any place it happens to be convenient. Fire-proof vaults are found throughout the building as well as spacious storerooms for each department's archives.

J. M. SMITH HENDERSON RECEIVER

Indianapolis, Ind., May 25—J. M. Smith, factory manager, has been appointed receiver for the Henderson Motor Car Co., which has announced its intention to retire from business. The appointment was made on the friendly suit brought by W. C. Mock, a representative of the Hydraulic Pressed Steel Co., of Cleveland, O., who based the suit on a claim assigned to him by the Warner Electric Co., Muncie, Ind.

The receiver will proceed to wind up the affairs of the company and distribute the assets. It is expected that the assets not only will cover the liabilities, but that there will be a comfortable sum to divide among the stockholders.

REO DECLARES BIG DIVIDEND

Lansing, Mich., May 20—The Reo Motor Car Co., at a meeting of the directors in this city today, declared a stock dividend distribution of 50 per cent of the capital stock, payable on June 1 to holders of record May 28. The capital stock is \$2,000,000, all one class. The additional stock distribution will bring the total capitali-



THE NEW MORRIS CAR THAT IS TO SELL AT \$500

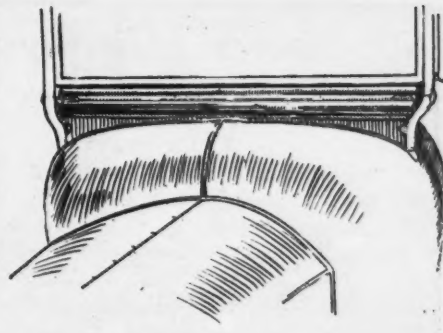
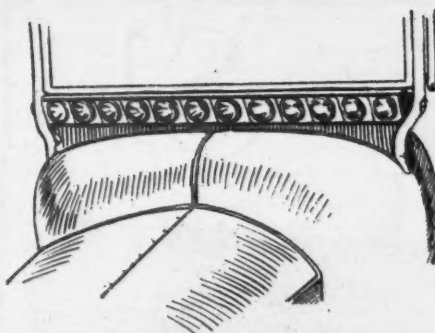
zation to \$3,000,000. The amount of new stock to be given will be \$1,000,000 of \$10 par value. The earnings of the Reo company reported the largest in the history of the company, being estimated in excess of 50 per cent per annum.

G. & D. REPORTS BIG BUSINESS

Boston, Mass., May 22—Gross sales of Gray & Davis, it is understood, are running about 36 per cent ahead of a year ago, which if maintained, would mean gross for the year of considerably better than \$4,000,000. Within the last 20 days, the company has received orders for between 60,000 and 65,000 systems, one contract alone calling for 20,000 sets. The company has taken care of a large portion of the current needs of its business through sale of about 1,600 shares of its preferred stock which netted the company par. There is now \$500,000 preferred outstanding out of a total issue of \$1,000,000 and \$500,000 common outstanding out of \$750,000 authorized.

NEW PRICE ON MOLINE 40

Moline, Ill., May 25—The Moline Automobile Co. announced that the series Moline 40-horsepower car hereafter will sell for \$1,550. Among the added features is a full floating rear axle, new type of body with bell-shaped back, ammeter on the dash, improved cranking generator, a better grade of leather and fabrics used in upholstery and top work and other refinements. The most important change is the installation of the floating rear axle, which supplants the semi-floating



A New Lighting Device Is Brought Out By the English

A NOVEL lighting idea for motor cars has been introduced in England under the name of the Auster windshield-light system. With this arrangement a row of twelve lamps is placed under the windshield as shown in the illustrations herewith, which are reproduced from the English journal, Motor. This row of lamps takes the place of both headlights and sidelights and when used during the day may be neatly covered by a shade. Of the twelve lamps, one at each end may be extended so that an oncoming driver may know the width of the car he is approaching. The row of lamps may be tilted so that the entire light may be directed toward the motor.

The switch controlling the bulbs is of the combination type permitting the two end lamps only to be used, which is the case when ordinary city driving is done; the next two bulbs on each side offering light from six bulbs, the central group of six lamps, combinations of these, or the entire twelve lamps.

All are used for country work where the road for some distance ahead must be illuminated. A small hand wheel conveniently located permits of the set being turned at any angle so that the light may be directed upon the road ahead, at some object overhead, etc. When in use during the day a neat shade drops before the set of bulbs as shown in one of the illustrations.

design used on previous series. The wheels are carried on double annular ball bearings and the wheel flange is fastened to the wheel by eight studs and nuts. The new Moline type of rear construction

permits the removal of the axle shaft without jacking up the wheels.

There are two motor changes—the lightening of the piston and a decrease in weight of the reciprocating parts which makes for less vibration and wear. Aside from these two changes the Moline new series will be produced as before with a four-cylinder motor of $4\frac{1}{8}$ -inch bore and 6-inch stroke.

Britons Planning To Build \$500 Car

Come to America To Buy Their Motors

A BRITISH-BUILT car to list at \$500 and thus meet American competition is planned and definite steps have been taken to put it on the market. America, however, will figure in the production by furnishing the motors for this new English construction.

Facts in the case were brought out through the visit of W. R. M. Morris, of the W. R. M. Motors Limited of Oxford, England, to the plant of the Continental Motor Mfg. Co. at Detroit, where he placed an order for 5,000 motors to be used in this new \$500 car, which is to be assembled in England.

The motor which Morris will use in his car, the Morris-Oxford, already a well-known make, is the Continental model U. It is distinctly a new type in American manufacture. The bore and stroke are $2\frac{3}{4}$ by 4; the crankcase and cylinders are cast in one piece; the oil pan is of aluminum; the crankshaft has three liberal-sized bearings; lubrication is by a complete force-feed system; the lines are European. The first motors of this order are now going through, and Morris has

spent a great deal of his time for the past 2 months in the two Continental plants, in Muskegon and Detroit, bringing with him his own staff of engineers to oversee the preliminaries.

The Morris factory is in Oxford, the seat of Oxford university, 64 miles from London. He has facilities for turning out on the assembling plan about 100 cars per week, but probably will find it necessary very soon to increase his capacity.

"I shall fight the American invasion with American methods," states Mr. Morris. "It is folly to try to meet it in any other way. British cars built in accordance with British traditions are mechanical masterpieces, better perhaps on the average than American cars, but they are helpless against the American type, for no British or European manufacturer is producing cars in quantity.

"The European method is that of the workshop rather than that of the factory; paying much attention to details, painstaking to a fault, but exceedingly slow. Standardization in the American sense is practically unknown.

WALPOLE SALE IN JUNE

Boston, Mass., May 22—At a hearing before Judge Dodge in the United States district court, counsel for the receivers of the Walpole Tire and Rubber Co., recommended that the property of the company be offered for sale at public auction on or about June 24 in one lot and without an upset price. An attempt to sell the property on May 11 failed as the only bid received was for \$800,000, as against an upset price of \$1,150,000. Receivers also recommend that the cash deposit required be reduced from \$60,000 to \$25,000.

NEW WESTCOTTS ANNOUNCED

New York, May 22—The 1915 Westcott has made its appearance in this city and is featured by \$100 reduction in price. The former price was \$1,385 and the car now sells for \$1,285. No changes are noticeable in the construction of the car, the four-cylinder 3.5 by 5-inch Northway motor with block cylinders still being used, in connection with the Schebler carbureter and Jones' lighting and starting system with Atwater Kent ignition.



Shipping the Car to Europe

By Edwin P. Kohl

Editor's Note—American motorists contemplating a tour of Europe will find in Mr. Kohl's article much of value in the way of information as to shipping the car and also will learn of the attractions Great Britain has for tourists. Mr. Kohl, it will be remembered, is the former University of Wisconsin student, who is driving around the world in a Henderson, using kerosene as a motor fuel.

DURING the past season of 1913, more than 600 American tourists had their motor cars shipped abroad to England alone, according to the records of the steamship companies and the British motor organizations. This would indicate that it has become not at all uncommon for Americans to plan their trip abroad with their motor cars.

Experience has shown that it is more economical and satisfactory for a resident of the United States to ship his car to Europe than to buy a foreign make on arrival and dispose of it before departure. As the stream of American motorists abroad is rapidly swelling each year, it will be of interest to those contemplating a motor tour of Europe this summer for the first time to learn at this time the cost, convenience and desirability of such a trip. England is most like the United States and still typical of the other European countries, so an American motorist's experience in that country during the past season may be taken as illustrative.

Cost of Shipping

The cost of shipping a car across the Atlantic is naturally the largest single item of expense. Cars must be crated which costs about \$45. The freight charge varies according to the size of the crated car, being about 19 cents a cubic foot. As the average touring car contains about 750 cubic feet when crated, the shipping cost is about \$140. The total transatlantic expense for the average touring car is then about \$185 on a fast boat and from \$10 to \$20 less on a slower one. A prospective shipper can estimate this by determining the cubical size of his machine. If the front bumper or rear extensions are removed and the steering wheel lowered, this may be considerably decreased.

Parts removed, as well as extra luggage, may be put in the crate below the car without extra charge as the rate schedule is based wholly on dimension and not on weight. The steamship companies have facilities for taking complete charge of

the shipment from the time the car is brought to the dock until it is placed at the disposal of the driver, ready to run, at its destination, or the matter may be left entirely to a shipping company. The cost for either is about equal.

All oil and fuel is drained off before the car is crated, so the prospective shipper will do well to let the supply of both run low before taking the machine to the dock. Some companies require the disconnection of all wires from the battery. Even the emptying of the liquid from the battery will be required shortly, it is said, as the crate may become overturned, allowing the escaping acid to destroy what it comes in contact with. The steamship company nominally takes all risks of the car during transit except for breakage in getting the car on and off board and for theft, but it has been found difficult to collect damages from them. Thus special insurance for passage across is advisable. The cost of this is $\frac{1}{2}$ per cent of the value of the machine.

Preparing for Shipment

A car for shipment abroad must be brought to the dock at least 2 days before the time of sailing of the boat. While the tourist and the car may, of course, go on the same ship, it is advisable to have the machine sent somewhat earlier so that there may not be any delay at the port on arrival. If the departing motorist be a member of the American Automobile Association or of a club affiliated with foreign clubs, as many of the larger ones are, he may have the supervision of getting the car from the dock, supplied with

oil and fuel, and ready to run, at the disposal of the incoming owner, without extra cost, by the club's foreign representative. He also will secure the registration of the car in that country, get the driver's license, which is required in Great Britain, and obtain the number plates for the car. The charges for uncrating and port dues vary somewhat for the different localities, but are \$5 and \$3 respectively at Liverpool. The British registration fee is \$5, the driver's license costs \$3 and the number plates 85 cents. These figures are approximations of English money.

Mention may be made here that ordinarily cars can be shipped only to London, Liverpool and Southampton in England as only lighters for passengers and light freight meet the Atlantic liners at Plymouth, Fishguard and Queenstown, Ireland. The machine may be shipped from Holyhead, Wales, or Stranraer, Scotland, to Ireland for a charge of \$15 and \$10 respectively in addition to the more expensive rate from Liverpool. Passenger fare itself to Ireland from the above ports is about \$2.

Red Tape in Europe

Triptyques or special customs-papers for practically all foreign countries—not needed in Great Britain—and international passes can be secured in America through the motor clubs, but they can best be arranged for on arrival abroad, because conditions are better understood and the information and facilities are better.

By means of the former, tourists avoid the trouble, delay and expense of depositing duty at each frontier. American motorists may become associate members of English motor organizations at half regular members' rates or from \$2.50 to \$5, and have all the facilities of the latter at their command. They can then deposit with the foreign motor association the duty payable in the countries included in the proposed tour and obtain triptyques or entry permits for their cars, which are recognized by the foreign customs authorities at each frontier. The amounts so deposited are refunded by the motor organi-

zation to members on return of the trip-tiques. The same bodies also obtain international traveling passes for the tourist whereby the expense and troublesome formalities relative to obtaining foreign licenses and markers in every country visited are avoided.

The American motorist planning a trip abroad need not provide himself with a number of spare tires before leaving, for, although in Europe the metric system of measurement for tires is used, it is not difficult to obtain American style tires, measured in terms of inches. A little difficulty may be experienced with metric screw threads and tools in use on the continent, though not so much in England. Being provided with the latter for the foreign tour may save some inconvenience and delay.

British garages are in some features inferior to those in the United States and in other ways superior. Compressed air is sadly lacking in nearly all. Air bottles may be obtained at a few of the larger garages. The inclined plane has not been supplanted by the elevator, as universally as in our land. As a rule, they do not carry as complete a line of supplies as our garages. The rates are uniformly lower.

The average charge for storage per night is 35 cents, washing 50 cents and labor for repair work from 35 cents to 60 cents per hour. On the other hand, petrol—as gasoline is called in England—which is sold only in 2-gallon cans, is 40 cents and more per gallon, and kerosene, called paraffine, for cars using that fuel, is about 16 cents a gallon. Cylinder oil is from 25 cents a quart up. Vulcanizing costs from 25 cents to 50 cents per tube. The cost of casings is 25 per cent and more lower than in the United States. Steel-studded tires are in very common use. In England little re-treading is done, the charge being about \$15 for a 35 by 5 non-skid tread. Motorists seem to feel that under present prices for casings, it is cheaper in the long run to discard them when they become badly worn and buy new ones.

Comparison of Fuel Prices

The reason the European motorist was interested in the fact that I am using kerosene as a fuel can easily be perceived when the prices for gasoline and kerosene respectively in foreign countries is considered. I give the prices for only the five largest countries visited, as the cost in the smaller countries is similar to that of their larger neighbors.

Country	Gasoline	Kerosene
Great Britain	40 cents	16 cents
France	55 cents	31 cents
Germany	45 cents	18 cents
Austria-Hungary	52 cents	22 cents
Italy	65 cents	28 cents

These figures are taken from my expense book as the actual average price paid personally for fuel. A slight allowance may be made in the gasoline figures, as we bought only small quantities at a time for priming purposes. Otherwise they graphically illustrate the saving in

the fuel bill on a kerosene-consuming car in Europe.

The hostilities of the United Kingdom are uniformly good. In all the larger cities there are so-called American hotels, which cater directly to visitors from our shores. In these the features of our hotels are copied so that an American is made to feel very much at home. On the other hand, if the tourist desires to patronize real "H'English 'otels" to get closer to the characteristics of our English cousins, he will find much in their customs which will make interesting experiences. The four meals a day system may be one of the hardest things to become accustomed to. In some outlying districts, it seems hard to impress upon the proprietor your desire for a bath. This seems to some of the old school to be a luxury which travelers should not expect to be supplied with.

Beauties of England

One of the delightful features of travel on English highways is the profusion of quaint country inns scattered along the principal roads. The motorist need not hurry on to the next large city for the night or meals, for many of these wayside

shelters for travelers offer a hospitality to the stranger which would make mein host in America green with envy. Many of these inns still remain as they existed in the old coaching days. The variety of their names would make a good vocabulary. One of these near Hindlow, "The Quiet Woman," seems to be rather antedated in these days of woman suffrage demonstrations in England. Quite a few still rest their reputation upon the fact, as heralded upon a sign-board, that a King Henry once tied his horse on their post, about 1600 A. D.

Roads in Great Britain

English roads are so much superior to ours, especially in our west, that a comparison is a reflection on the former. Throughout the kingdom the roads are kept in a uniformly excellent condition. The British are not afraid to spend some money on good highways, for they have found that it is a paying investment, not an onerous expenditure. And they leave the making of their roads to professional road-builders, who profit by their past experience, instead of letting the farmers work off their road taxes by ploughing up the middle of the highways periodically.



MAP OF GREAT BRITAIN SHOWING PLACES OF TOURING INTEREST

English roads, like the old Roman roads over which many of them run, are built to last. As they are kept in a high grade condition by constant attention, the traveler never is confronted by frequent bad stretches so common in all parts of our land. Ways as the Great North road between London and Edinboro, a distance of 400 miles, and Watling street, between London and Liverpool, 200 miles, are swept.

But not merely the main trunk lines are well made and kept. Through the Pentlands of Scotland, in the poor peasant districts of Ireland, over the rugged hills of Wales and along the smallest country lanes of England, the motorist always is assured of good roads. In a 2,000-mile tour from one end of the kingdom to the other, often branching off on outlying ways, we did not find one stretch of road as poor as, for instance, parts of the main highway between Rochester and Albany in the Empire State of the union.

A direct benefit of these wonderful roads to the motorist is the resulting decreased cost of running a machine. Much smaller tires can safely be used on English than American cars; the large size of ours, even on a two-passenger roadster being frequently commented upon. A greater mileage per gallon of fuel also is secured; 20 to 25 miles in country travel being usual.

Car Longevity in England

The general wear and tear on a car is markedly decreased as indicated by the relatively longer life of a similar grade car in England and in the United States. We saw more cars, by far, of a certain American company throughout the British Isles than of any other make. The success of that rather inexpensive car there generally is attributed not merely to its lower initial cost to the purchaser but to the good roads. When the economy for the total of English cars is computed, the value of good roads to the motorists alone, not to mention the large amount of other traffic, would seem to repay our English cousins well for their road-making efforts.

British history, literature and the people themselves are so closely connected with our own that a motor trip through the islands has a special interest for Americans in addition to the ordinary pleasures of touring. It seems that every little hamlet was the birthplace of some poet, the scene of a historic event or connected with the progress of science. To these shrines of the English-speaking people, the motor car carries the pilgrim most expeditiously, for many are far removed from the railways and travel by coach is slow and tedious. The tourist who formerly was content to visit one of these historic spots in a day or so can now be swiftly and pleasantly carried in a motor car to a dozen in the same time. Oxford university, the Shakespeare country, Sherwood forest, Warwick castle, Cambridge university, St. Albans and Windsor castle, not to

mention London and a score of other places of interest, are all within a day's run of each other. The Burns country, the Scot country and similar localities associated with literature in that region, to "do" which the visitor on foot or by coach is wont to allow a week, can all be advantageously seen from a machine from dawn to dusk.

Picturesque Scenery Abounds

The picturesque British and Irish scenery is seen at its best from the seat of a touring car. As the motor winds its way around the lakes of Killarney, in Ireland, down the steep slopes around Loch Lomond in Scotland, through the lake district of England and up the rugged Holyhead road in Wales, the tourist feels the exuberance of being wafted swiftly and pleasantly over a wide expanse of natural beauty spread out before him. Instead of seeing the wonders of nature flit by the train windows, the motorist can behold and contemplate them on all sides at leisure. The motor tourist abroad has all the joys of the free and open road and none of the discomfort of foreign railway travel.

The United Kingdom is comparatively small for an American motorist who may have done considerable touring and the cost of seeing the most interesting parts of the isles in a machine is modest under ordinary circumstances. For a party, it probably can be done as cheaply as by other means of locomotion. We traversed all of the four divisions of the kingdom, taking over 6 weeks' time, in a two-passenger Henderson roadster at an outlay on the car of about \$70.

The right or left-hand drive question seems to be as far from settled in Europe as in the United States. One of the reasons why it seems so hard to arrive at a definite solution is because there are so many varying rules of the road in the different countries. Citing merely the countries we have toured in:

Great Britain—Drive on the left side of the road, pass on the right.

France—Drive on the right side, pass on the left.

Germany—Drive on the right side, pass on the left.

Austria-Hungary—Keep to the left, overtake on the right, except in the following provinces:

Tyrol, Carniole, Istria, Carinthia and Dalmatia—Drive on the right, overtake on the left.

Holland and Belgium—Keep to the right, pass on the left.

Italy, in most of the large towns—Drive on the left, overtake on the right.
Italy, on the country roads—Vice versa.
Switzerland—Keep to the right side, pass on the left.

After the American motorist has encountered these various rules of the road, in the different countries of Europe, he begins to wish there were a subway or elevated road for traffic going in the opposite direction so that he might always keep in the middle of the road without fear of collision.

In England, as above noted, the rule of the road is just the opposite to what it is in the United States, yet the right-side drive is the universal rule on British cars. This means that the English motorist in reality has our left-hand drive. The English manufacturers have no idea of changing to what amounts to our right-side drive for their customers prefer the present scheme. On the other hand, we who had become accustomed to the left-side drive in the United States found it more inconvenient to pass other cars on the narrow English roads, seated on the side away from the passing machine.

So also, in stopping at the curb on the left side of the street, it was more difficult to walk around to the other side of the car in a muddy road or climb over the other passenger. We thus were at the same disadvantage with a left-drive in England that a man with a right-hand drive machine is in America. This the sharp-eyed Englishmen were quick to perceive and their surprise was that all American cars were not equipped with the left-hand drive.

In France and Germany, where our scheme of passing other vehicles on the road is in vogue, left-hand drive cars are very numerous. Most of the big factories, like the Mercedes in Germany, give the purchaser the option of the style of drive. In Italy, where the left-side drive and right-hand passing is the rule where motor cars are most numerous, the Isotta, Fiat and similar standard Italian makes, are equipped with right-hand drive, we observed. While in Europe there is agitation for a uniform universal rule of the road, until that scheme is established the system most favored evidently is to have the driver on the side nearest to cars passing in the opposite direction.

Answers to Inquiries for Routes

Colorado-Florida

GRAND JUNCTION, Colo.—Editor Motor Age—I would like some information on a route to Florida. We expect to start from Denver and would like to go east and see the most important cities and places of interest and to keep on the best motor routes. We would like a couple of different routes suggested. We are going to start out for a good time and intend to take all the time we need.
—Mrs. J. W. Rector.

The route most often traversed is that to Julesburg, North Platte, Grand Island, Omaha, Des Moines, Cedar Rapids, Clinton, Chicago, South Bend, Bowling Green, Cleveland, Erie, Buffalo, Rochester, Syracuse,

Utica, Albany, Poughkeepsie, and New York. Traveling south along the coast your routing is Trenton, Philadelphia, Baltimore, Winchester, Staunton, Roanoke, Winston-Salem, Charlotte, Greenville, Atlanta, Macon, Valdosta and Jacksonville.

If you want running directions of the entire trip, you can secure same in the Blue Books 5, 4, 1 and 3 taken up in succession. Each volume is \$2.50 and can be secured from the Automobile Blue Book Publishing Co., Karpen building, Chicago.

Sioux Falls, S. D.-Springfield, Ill.

De Smet, S. D.—Editor Motor Age—Kindly give the route from Sioux Falls, S. D., to Springfield, Ill., and distance. I should also

like a route from De Smet to Mapleton, or Mankato, Minn., with distance.—J. F. Wolkow.

A 95-mile run will see you in Sioux City, Ia., by way of Canton, Beloit, Fairview, Hudson, Hawarden, Chatsworth, Akron, Westfield, and 136 miles to Ft. Dodge, via Moville, Correctionville, Holstein, Galva, Early, Sac City, Rockwell and Moorland. Des Moines is a 93-mile run through Roberts, Dayton, Ogden, Boone, Luther, Madrid, Polk City, Sailor, and Highland Park. Des Moines through Ottumwa to Ft. Madison is 174 miles, and through the towns of Prairie City, Monroe City, Otley, Pella, Oskaloosa, Fremont, Ottumwa, Batavia, Fairfield, Stockport, Hillsboro, Houghton and Denmark.

Ft. Madison to Quincy, Ill., along the river is through Powellton, Hamilton, Keokuk, Sutter, Lima and Ursa. It is generally good going the 120 miles through Camp Point, Clayton, Mt. Sterling, Ripley, Rushville, Pleasant View, Frederick, Beardstown, Bluff Springs, Virginia, Philadelphia, Ashland, Pleasant Plains, and Bradfordton.

For your other route, it is 43 miles to Brookings through Lake Preston, Arlington and Volga, then 156 miles to Mankato through Elkton, Lake Benton, Florence, Garvin, Tracy, Walnut Grove, Lamberton, Springfield, Sleepy Eye, New Ulm and Cortland.

Le Mars, Ia.—Woonsocket, S. D.

Traer, Ia.—Editor Motor Age—Please give the best route from Le Mars to Woonsocket or Wessington Springs, S. D.—H. C. Schulz.

From Le Mars to Sioux Falls your routing should be through Maurice, Sioux Center, Ruck Valley, Inwood and Canton, then 76 miles to Bridgewater, Emery, Alexandria, and Mitchell. Woonsocket is north of Mitchell in the next county.

Sheridan, Wyo.—St. Joseph, Mo.

Sheridan, Wyo.—Editor Motor Age—I am having some difficulty in planning a motor car trip east. I would like the best route to St. Joseph, Mo., by way of Lincoln. Could we strike a shorter and better route direct?—E. E. Arnold.

Do not fail to take a heavy rope and a shovel. There should be two cars in the party before attempting this trip, as the travel is through long stretches of uninhabited country. There are several long stretches where no water can be secured, and it is absolutely fool-hardy to travel without extra supplies.

From Gillette to Deadwood, S. D., it is 122 miles through Moorcroft, Sundance, Lost Canyon, Spearfish Crossing, Billy Mine, and Lead City. Turning south you motor 194 miles to Lusk, Wyo., going the first part through the very heart of the famous Bad Lands. The itinerary lies through Merritt, Pactola, Sheridan, Hill City, Sylvan Lake, Custer, Wind Cave, Hot Springs, Minnetonka, Edgemont, Hat Creek; fair to good natural roads continue 148 miles to Cheyenne, traversing through Frederick, Guernsey, Uva, Wheatland, Chugwater and Fort Russell.

Going east on the Lincoln highway as far as Grand Island the roads are good, hotel conditions are good, and the mileage is 331 miles, traversing through Egbert, Pine Bluff, Bushnell, Kimball, Dixon, Potter, Sydney, Lodgepole, Chappell, Julesburg, Blue Springs, Ogallala, Paxton, Sutherland, North Platte, Inland, Gothenburg, Cozad, Lexington, Elm Creek, Kearney, and Shelton.

A well dragged road extends to Lincoln, 100 miles, through Hampton, York, Waco, Utica, Tamora, Seward, and Emerald, and to St. Joseph, Mo., 180 miles, through Unadilla, Syracuse, Dunbar, Nebraska City, Auburn, Howe, Stella, Verdon, Falls City, Hiawatha, Highland, Severance, Troy, Wathena, and Elwood.

Wellington, Kan.—Memphis, Tenn.

Wellington, Kan.—Editor Motor Age—What would be the best route from Wellington,

Kan., through Arkansas to Memphis? What would be the probable condition of the roads in that section in June?—X.

Such a trip would be south through Oklahoma and across the central portion of Arkansas. Leaving Wellington go directly to El Reno, 151 miles, over the Chisholm trail, which is a section of the Meridian road, through Caldwell, Jefferson, Enid, Henesey, and Dover. At El Reno you have the choice of two routes, one going directly east to Oklahoma City and thence south to Dallas; or, continuing south on the Meridian road through Lawton to Fort Worth, thence to Dallas.

The first route is as follows: El Reno, Yukon, Oklahoma City, Lexington, Wynnewood, Seagar, Emet, Durant, Dennison, Van Alstyne, McKinney, Dallas, 313 miles over natural dirt roads which are kept in good condition. The alternate route from El Reno, about 17 miles longer, is via Chickasha, Stecker, Lawton, Emerson, Burkburnett, Wichita Falls, Bellvue, Alvord, Decatur, Fort Worth, Grand Prairie, and Dallas. There is a good road the entire distance. Should you encounter some wet weather, it would be well before leaving Emerson to inquire as to the condition of Cache and Deep Red Creek bottoms.

Leaving Dallas go east to Texarkana, Ark., 219 miles, via McKinney, Vadalla, Bonham, Windom, Paris, Detroit, DeKalb, Texarkana. Continuing eastward to Hot Springs, 129 miles, the route goes through Emmet, Gurdon, Arkadelphia, to Hot Springs.

Between Hot Springs and Little Rock you will find mostly good gravel roads, passing through Lonesdale and Benton, 54 miles. After leaving Little Rock you still have 162 miles to motor, and should you encounter wet weather careful inquiry should be made as to the passability of the road. The towns en route are: Lonoke, Hazen, Wheatley, Forrest City, Marion, Memphis. Caution should be used in driving from Forrest City to Memphis. For complete running directions see Volume 5 of the Blue Book.

Victoria, Tex.—Wahpeton, N. D.

Victoria, Tex.—Editor Motor Age—Kindly outline the best route from Victoria, Tex., to Wahpeton, N. D.—Walter A. Dunn.

From Victoria go directly to San Antonio, thence north through New Braunfels, Austin, Granger to Waco, where you strike the Meridian road, over which you can continue to your journey's end. Leaving Waco the route lies through Waco, Dallas, Dennison, Oklahoma City, and Arkansas City to Wichita, Kan., thence via Newton, Salina, Belleville to Geneva, Neb., and crossing the state of Nebraska, through Columbus, Madison, Norfolk, to Yankton, S. D. From Yankton, the balance of the route is via Bridge-water, Salem, Madison, Watertown, White Rock to Wahpeton.

The Meridian road is a natural dirt highway and is kept in good condition by dragging. For complete running directions you are referred to Volume 5 of the Blue Book, which also gives optional routes should you desire to visit some of the larger cities such as Topeka, Kan., Omaha, and Lincoln, Neb.

Tulsa, Okla.—Memphis, Tenn.

Tulsa, Okla.—Editor Motor Age—Kindly give me the best route from Tulsa, Okla., to Memphis, Tenn.

It is hard to outline a route with satisfactory road conditions for, as you undoubtedly know, the roads in Arkansas, and many in Oklahoma, are anything but ideal for touring, and all Motor Age can do is to give you a town-to-town itinerary.

From Tulsa, follow the M. K. & T. Railroad to Muskogee, thence to Sallisaw and Fort Smith, Ark. Crossing Arkansas through Charleston, Paris, Dardanelle, Galla, Morrilton, Conway, Little Rock, Lonoke, Hazen, Clarendon, Wheatley, Forrest City, Madison, Marion, Mound City, to Memphis, Tenn. We

would suggest that you make careful inquiry along the route as to road conditions, etc. Volume 5 of the Blue Book will give you the complete running conditions from Little Rock to Memphis.

Macon, Ga.—Norfolk, Va.

Dawson, Ga.—Editor Motor Age—We would like a good route outlined from Macon, Ga., to Norfolk, Va.—Lamar Automobile Co.

First go to Atlanta, Ga., via Barnesville, Griffin, Hampton, and Hopeville; then through Decatur, Snellville, Winder, Pocatigo, Canon, Anderson and Piedmont to Greenville, S. C. Greenville to Charlotte, S. C. is through Duncan, Converse, Grover, N. C., Bessemer City, and Lowell. The way points between Charlotte and Greensboro are: Concord, Salisbury, Lexington, and Jamestown. From Greensboro go through Burlington, and Chapel Hill, to Durham, thence via Providence to Henderson, N. C.

From Henderson pass through Vaughan and Littleton to Roanoke Rapids, at which point you have the choice of two routes to Norfolk: One going through Jackson and Portsmouth to Norfolk; the other via Emporia and Stony Creek to Petersburg, thence to Wakefield, Windsor, and Morris Fork into Portsmouth, where you cross the ferry into Norfolk, Va. Approximate total distance is 835 miles. Complete running directions may be found in Volume 3 of the Blue Book.

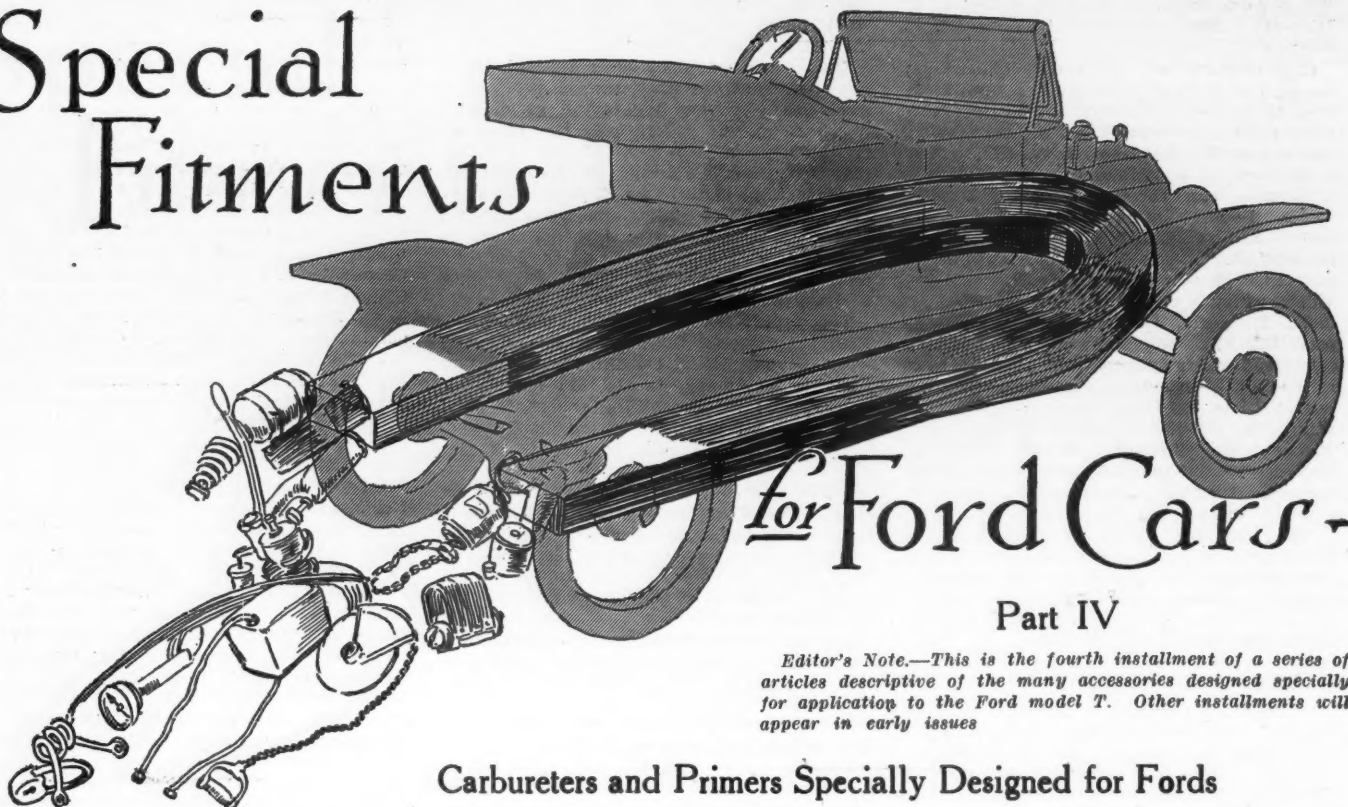
Des Moines, Ia.—St. Louis, Mo.

Des Moines, Ia.—Editor Motor Age—I would like some advice on the best routes from Des Moines to St. Louis, Chattanooga, Atlanta, Jacksonville, Charleston, Richmond, and Washington, D. C.—F. J. Leeds.

The routing to St. Louis is through Oskaloosa, Ottumwa, Fairfield, Hillsboro, Ft. Madison, Keokuk, Quincy, Hannibal, Louisiana, and Troy. Through Illinois to Paducah the run is by way of Belleville, Pinckneyville, Murphysboro, Jonesboro, Belknap, and Brookport, taking the ferry across the river. Paducah to Nashville should be routed through Tyler, Woodlawn, Briensburg, Birmingham, Egner's ferry, Golden Pond, Canton, Cadiz, Hopkinsville, Ringgold, Clarksville, Port Royal, Adams, Cedar Hill, and Springfield. It is 247 miles to Chattanooga from Nashville through Murfreesboro, Shelbyville, Fayetteville, Meridianville, Huntsville, Gurley, Paint Rock, Woodville, Larkinsville, Scottsboro, Bridgeport, Jasper, and Rankins ferry. To Atlanta it is 127 miles, and the itinerary is Ringgold, Millican's, Tunnel Hill, Dalton, Rosaca, Calhoun, Adairsville, Cassville, Cartersville, Emerson, Altoona, Acworth, Kennesaw, Marietta and Smyrna. To Jacksonville, Fla., it is 97 miles, to Macon, Ga., through Hopeville, Jonesboro, Lovejoy, Hampton, Pomona, Griffin, Milner, Barnesville, Forsyth, Smarrs, Bolingsbroke, and Lorane. The balance of the run is 292 miles, and the routing is Echeconnee, Vienna, Sibley, Worth, Ashburn, Sycamore, Cycloneta, Chula, Tifton, Eldorado, Lenox, Adel, Hahira, Mineola, Valdosta, Lee, Ellaville, Falmouth, Live Oak, Houston, Welborn, Lake City, Watertown, Olustee, Sanderson, McClenny and Baldwin.

Go north along the coast from Jacksonville to Savannah, then to Green Pond and Charleston. Through South Carolina to Greenville the run is via Otranto, Ladson, Summerville, Jeddburg, Harleyville, Bowman, Orangeburg, St. Matthews, Columbia, Spring Hill, Prosperity, Newberry, Clinton, Laurens, Fountain Inn, and Mauldins. To reach Richmond your routing should carry you through Spartanburg, Gaffney, Blacksburg, King's Mountain, Charlotte, Concord, Lexington, Winston-Salem, Martinsville, Rocky Mount, Roanoke, Natural Bridge, Lexington, Staunton, Charlottesville, Louisa, and Richmond. A pretty poor road is that to Washington, 187 miles, through Cuckoo, Louisa, Gordonsville, Orange, Madison Mills, Culpeper, Remington, Opal, Warrenton, Middleburg, Fairfax, Annandale and Arlington. 334.

Special Fitments



Part IV

Editor's Note.—This is the fourth installment of a series of articles descriptive of the many accessories designed specially for application to the Ford model T. Other installments will appear in early issues

Carbureters and Primers Specially Designed for Fords

SEVERAL carburetor makers have produced instruments specially designed for Fords. The chief object in these is to give better flexibility of the engine and somewhat more

power. Also in most of them provision is made for a needle-valve or air-valve adjustment on the dash in order to give easy starting in cold weather.

The Findelsen & Kropf Mfg. Co., Chicago, has added to its line of Rayfield carburetors the Ford-Rayfield equipment. The outfit includes a 1-inch model Rayfield carburetor, a manifold hot-air fitting, throttle control bell crank, a special gasoline connection and a dash adjustment. It can be installed in 2 hours by any mechanic. With all fittings it lists at \$23. The advantages claimed for it are greater efficiency, more power, more speed, greater flexibility, easy starting and less carbon. The dash adjustment makes for easy starting.

The Carter Carburetor Co., St. Louis, Mo., is putting out a special model of its Carter carburetor for Fords, known as the model F. Like the other models, it is of the multiple-jet type and embodies a choking valve for easy starting. It is stated that it will start a car without difficulty in any weather and can be installed by the owner in a short time. The instrument complete with manifold, levers and throttle connection costs \$20.40.

Probably the least expensive of the special carburetors for this car is the Shain ball-spray carburetor made by Charles D. Shain, Brooklyn, N. Y. In this instrument there is no needle valve. In its place is a ball valve or sprayer which revolves, due to the gasoline pressure, and throws a thin spray of gasoline, which is picked up by the air and sucked up at high velocity through the ten ports in the bottom. It is sold complete with hot-air pipe and all connections ready for installation for \$8.50.

The Wheeler-Schebler Co., Indianapolis, Ind., has brought out a special Schebler for Fords. This is the 1-inch model L, the rest of the outfit consisting of a manifold, primer, gasoline connection and throttle controls and dash adjustment. Price, \$18.

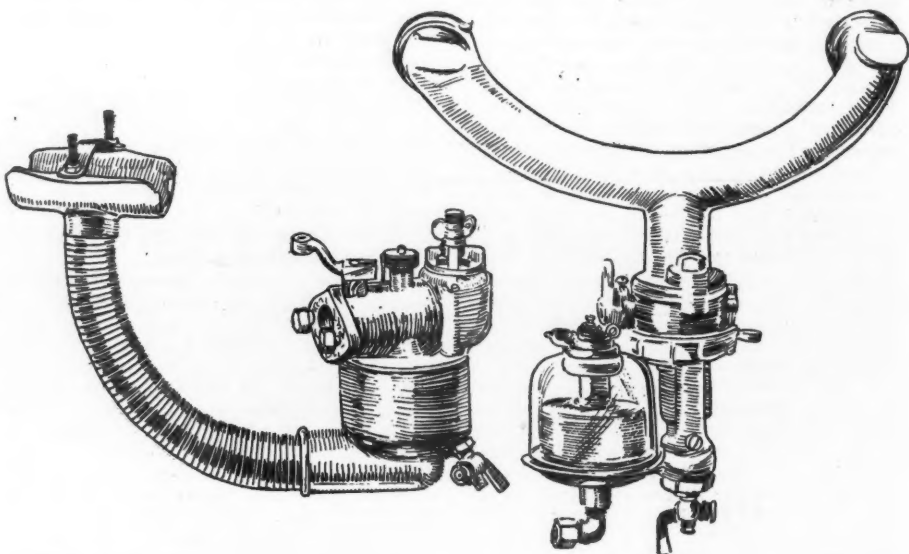
The Stromberg Motor Devices Co., Chicago, has a type B-3 Stromberg, which can be obtained with special manifold ready for installing. This has a special auxiliary starting device, a shutter valve in the main air intake and a cam which locks the auxiliary air intake shut. It sells for \$20.75.

The Kingston Ford Special can be attached to the present Ford manifold without alteration. This is the model Y and lists at \$20.

The Breeze Special Ford carburetor, a product of the Breeze Carburetor Co., Newark, N. J., is supplied ready to attach complete with exhaust hot-air connection. The carburetor flange is drilled for connection to the Ford manifold so that it is unnecessary to buy another. Several claims are made for this carburetor over that of the stock Ford instrument, among which are that 5 miles per hour more speed can be obtained, better throttling, better economy, and lower idling speed. This is accounted for by the makers in the fact that the main air passes the adjusting valve at 90 degrees and breaks up the fuel.

The carburetor has a self-priming top for easy starting. The throttle lever is made with the present control rod and only 30 minutes is needed to make the change. The price with the hot-air outfit is \$18; an allowance offered for the present carburetor.

The Holley carburetor, of which there are 375,000 in use as stock equipment on Ford cars, is made by Holley Bros. Co., Detroit, Mich. The 1914 model G combines all the 1912 model H-1 and the 1913 model H-3. The new model will enable an owner to accelerate the speed of a car from 5 miles per hour to 20 miles per hour, in 7 seconds it is claimed. The round taper valve type has been discarded and a needle type used instead. A new process is



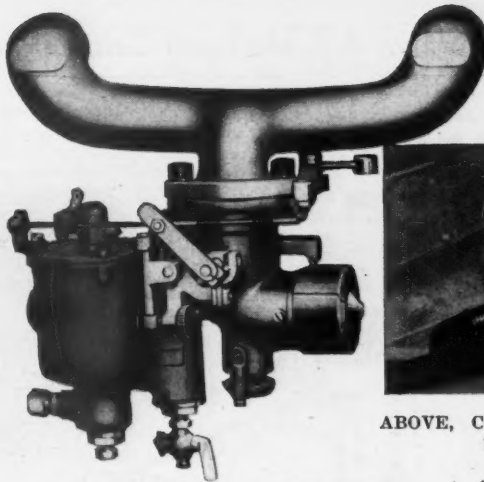
THE BREEZE CARBURETOR WITH HOT-AIR CONNECTION FOR FORDS

CARTER CARBURETOR AND SPECIAL FORD MANIFOLD

used in covering the cork floats so that they are impervious to the effects of benzole and other fuels which dissolve varnish.

The Alderman Mfg. Co., Rochester, N. Y., is making a primer and power magnifier which is designed for installation on Ford cars and also can be applied to others. The Alderman primer always is supplied with gasoline for priming, as it takes the gasoline from the carbureter feed line direct to the inside of the intake manifold near the valve. The apparatus consists of an attachment to the carbureter with the standpipe running into the intake manifold whose top is the same elevation as the bottom of the fuel tank. The connection is made to the gasoline feed line and a wire to operate the primer goes to a small control cock on the dash. This fitting also carries the operating handle for the power magnifier which supplies hot air taken from the coil around the exhaust manifold, to the carbureter. The air sprays from the magnifier is forced diagonally into the gasoline vapor in the carbureter and is intended to break the globules of gas into fine mist. The special Ford model is listed at \$5.00.

The Consolidated Gas and Electric Co., Chicago, manufactures a combined primer and hot-air heater and economizer in a special model for Ford cars. The priming arrangement is such that a spray of vaporized gasoline is drawn into the cylinders upon starting. It sells for \$10 with everything for quick installation.

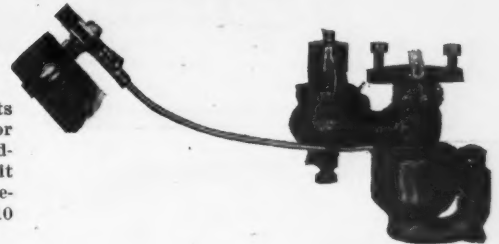


RAYFIELD-FORD CARBURETOR WITH SPECIAL MANIFOLD—DASH ADJUSTMENT IS PROVIDED.

The New York Coil Co., New York, markets the Nyc accelerator and power adder for Fords. The principle of the device is to admit a quantity of pure air to the mixture as it emerges from the cylinder. Attachment requires only a wrench, a screw-driver and 10 minutes' time, it is said. The price is \$5.



ABOVE, CONSOLIDATED GAS PRIMER; BELOW, SCHEBLER-FORD EQUIPMENT



Special Refinishing Outfits for Repainting Fords

THE fact that Fords generally are owned by those who cannot keep a chauffeur and therefore do not get the daily shining up that is necessary to keep the finish permanently at its best, has resulted in the development of special outfits for repainting and

refinishing. Inasmuch as the makers of these outfits can tell just how much of each material is needed for the car, the outfits can be marketed at a price generally lower than the separate ingredients would cost.

The Rie Nie outfit, put up by the Durkee-Atwood Co. Minneapolis, Minn., at \$6.50, contains all material necessary for a complete refinishing of the car. The standard outfit is black throughout, though gray running gears may be had on specification. The outfit includes body color, running gear paint, enamel dressing, varnish, cylinder enamel, hard rubber enamel and two brushes.

The Norwesco outfit, prepared by the Northwestern Chemical Co., Marietta, O., can be had with one color black and a choice of six others, one for the body and the other for the chassis. Where the two colors are ordered the outfit costs \$5.75, but if both chassis and body are black it may be had for \$5. The outfit contains body color paint, body color varnish, pigment varnish, top and upholstery dressing, hard-rubber finish, brass enamel, engine enamel, mahogany varnish stain, etc.

The Arsenal Varnish Co., Rock Island, Ill., is marketing painting materials for all types of cars, including a special outfit for Ford cars, which, with the book of instructions given, is sufficient to enable the owner or driver to give the car a new finish. The Ar-

senal company also is offering top dressings and special hood and fender outfits, in fact, everything to keep the car looking well. The Ford set sells for \$6.50.

Hamlne Bros., Baltimore, Md., manufacture the Ideal package for refinishing Fords. It is claimed that by the use of this package an owner can paint his Ford one day and use it the next. The outfit includes black body color and varnish, engine enamel, dash stain and dressing, top dressing, upholstery polish, chamois skin, waste, sandpaper, cheesecloth and brushes. It is sold at \$6.50.

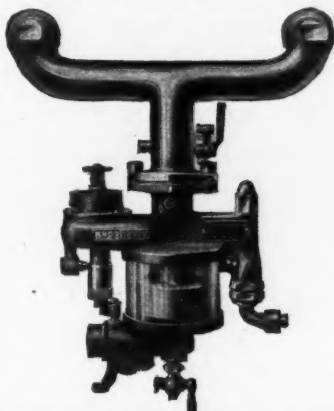
Clutch Release

A simple device that should be of assistance to amateurs in driving the Ford is the clutch release marketed by the Auto Parts Co., Chicago. This automatically releases the clutch when the foot brake is applied. Pressure on the brake pedal releases the clutch before the brake is applied, and if it is desired to coast, the brake pedal is simply pushed forward, which releases the clutch and pushing it fur-

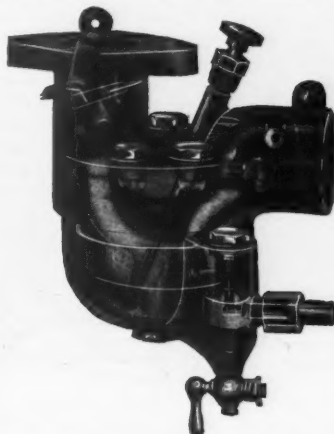
ther, applies the brake and brings the car to a standstill without the use of the emergency brake or the clutch pedal. The device may be installed with no other tools than a screw-driver, and 10 minutes is the maker's estimate of the time required. It costs \$1.00.

Hoyt Magnetometer

An electric meter which tells at a glance the condition of the Ford magneto has just been brought out by the Hoyt Electrical Instrument Works, Penacook, N. H. The meter is permanently connected to the magneto and fastened to the dash and indicates the condition of the magneto, whether it is in good, excellent, medium or poor shape. The instrument may be installed by any owner from the instructions given by the maker. It sells for \$4.



THE STROMBERG-FORD SPECIAL



CONSTRUCTION OF KINGSTON CARBURETOR

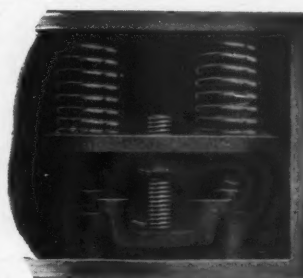
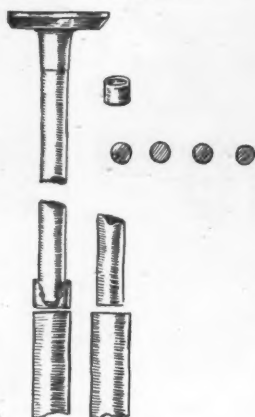
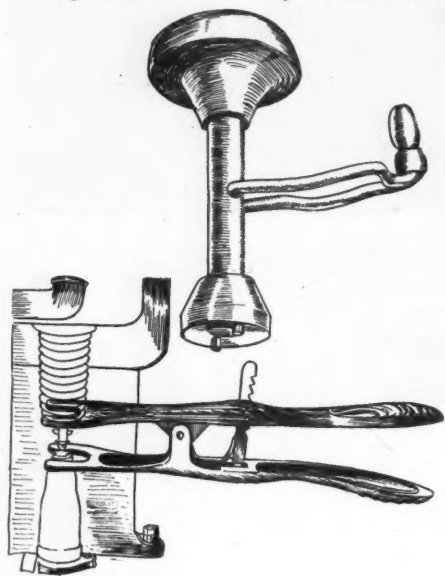


HOLLEY CARBURETOR FOR FORDS

Special Valve Adjusters and Grinders for the Ford

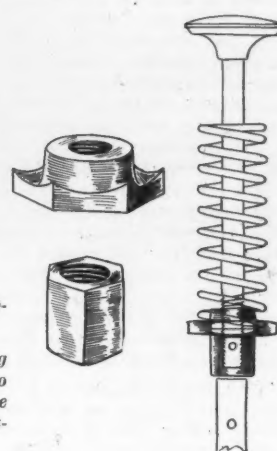
IN THEIR original form, Ford valves are not susceptible of adjustment for the natural wear occasioned by use. This, in time, results in a loss of power and more noisy operation. One ingenious method of adjustment is to fit over the lower end

of the valve stem or upper end of the push rod a small cap or shell within which are one or metal disks. This has the effect of lengthening the valve stem or rod to make up for the wear in the mechanism.



FORD VALVE GRINDERS AND ADJUSTERS

From left to right, Gemco valve spring release, and Gemco valve grinder; Auto Parts valve adjustment, Perfect valve spring release, Home lock-nut adjustment



The Auto Parts Co. sells a set of valve stem adjusters of this sort for \$1.50. These consist of hardened caps of steel and a quantity of very thin, hardened steel disks. To apply them it is necessary only to raise the valve slightly and slip an adjuster, with the proper number of disks in it, on the end of the valve stem. It is stated that the whole set can be put on in less than one-half hour. A similar one is made by E. Edelmann & Co., Chicago, for 50 cents, while the American Auto Supply Co. lists them at 50 cents. Similar ones are made by the Manufacturers' Supplies Co., Philadelphia, Pa., at \$1 per set of ten.

The Detroit Mechanical Starter Co., Detroit, Mich., markets a valve spring remover for

Fords at 60 cents, and a special valve grinder at 85 cents, and the Auto Parts Co. has a valve grinder and a special valve spring remover each at 60 cents. The Home Light Co., Chicago, puts out a set of adjusting lock nuts which are threaded on the valve stems, giving exactly the same adjustment as is provided on larger cars. These sell for \$5 the set. The Townsan valve adjuster and silencer is a similar adjustment and is made by the Townsan Auto Specialty Co., Mitchell, S. D.

An oil-tempered spring-steel cylinder is constructed so that it will grip the exposed end of the push-rod, forming a receptacle for thin steel discs which are used to regulate the lift of the valve and which form a cushion for the valve-stem. This eliminates the click, takes up the wear, and makes it possible to adjust the valves from time to time as needed. The price is \$1.50.

A special set of tools and materials for

grinding Ford valves is made by Winton L. Smith, Newark, N. J., and called the Perfect valve grinding set. It includes a valve spring lifter, a valve turning tool, a wrench socket, thickness gauge and instructions, as well as two grades of valve grinding paste. The set sells for \$2. The feature of the outfit is the device for lifting the valve springs so that the valves may be removed easily. It lifts two valve springs at once and leaves the operator's hands free.

It is a slow and expensive operation to replace or take up crank bearings or make any other crank case repairs on Fords of a vintage earlier than 1912 on account of the fact that the engine has to be removed. To make the crank case accessible, the Gardner Engine Starter Co. makes an auxiliary engine base, which fits the bottom of the crank case and weighs only six pounds. It sells for \$6 a set.

Axle Trusses, Radius Rods, Anti-Rattlers and Special Tools

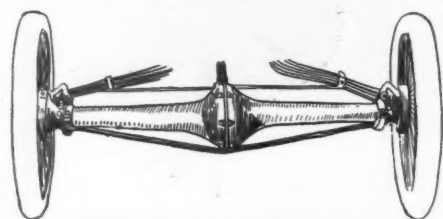
WHEN the car is to be overloaded very often or when the rear end shows signs of looseness due to wear it often is found advisable to reinforce the rear end connections. One of the devices for this purpose is the Gardner truss, made by the Gardner Engine Starter Co., Chicago. It consists of a stirrup clamping around the rear end of the torsion tube and passing around the joint of the differential housing. A groove in the loop of the stirrup fits over the joint in the housing and prevents any tendency to spread at that point or the joint between axle and shaft housings. This prevents misalignment of the gears and leaking of oil. It does not affect the clearance under the axle. It sells for \$3.

Sunvold & Larson, Sacred Heart, Minn., are introducing the S & L rear axle truss for Ford cars which is said by the makers to prevent rear axle breakage, axle and drive shaft vibration, gear stripping and the rear axle becoming out of alignment. The truss, which sells for \$3.25, may be clamped to the rear axle housing in a few minutes, no special tools or drilling being required. The truss is made to brace the differential housing.

A truss rod for Fords which prevents the sagging and breaking of the rear axle is marketed by the Specialty Sales Co., St. Louis, Mo. It is stated that it requires only 10 minutes for installation and is guaranteed for 2 years. It sells at \$2.50. A tandem front radius rod brace and axle aligner, by which

the Ford axle may be lined up with a turn of the wrench, and which holds the alignment, preventing bent radius rods, is sold at \$3.50 by A. S. Halls, Ortonville, Minn.

A combination safety radius rod and front axle support is produced by Monnich & Rogers, Hooper, Neb. This device consists of radius rods fastened directly to the frame and on the spring bolt, under the front axle. It is intended to make the car steer better and relieve the crankcase from road shocks. It is put out in such a manner that the regular Ford radius rod is relieved from all strain or may be removed, if desired. The rivets holding the crankcase hangers sometimes become loose, allowing the oil to leak out, on account of the continual road jar and shock on the crankcase. The new device is intended to relieve this strain and shock and make the front axle rigid. It is made of 1-inch steel tubing with a $\frac{3}{8}$ -inch wall and the



SUNVOLD & LARSON'S AXLE TRUSS

clevis and fastenings are drop forgings. It can be attached in 1 hour.

There is no means of adjustment provided to take up for the wear in the Ford front axle radius rod ball, and in the course of time this sometimes gets noisy. The Auto Parts Co. makes anti-rattlers to overcome this difficulty. These are made in two styles, one operating by the insertion of metal discs at \$1, and the other having a screw adjustment selling at \$1.50. This concern also has an anti-rattler and screw adjustment for the steering gear, which sells at \$1 and a brake rod support that prevents rattling of this part. Price, \$2.

The Mosco anti-rattling ball socket for the steering rod and for the radius rod is made by the Motor Specialties Co., Waltham, Mass., one listed at \$1 and the other at \$1.50. These can be adjusted with a monkey wrench.

The Emil Grossman Co. has a similar one made to replace the solid cap. The ball end of the radius rod fits into a hollow steel plug inserted in a coil spring, which absorbs vibration. Wear may be equalized by turning up the threaded plug with a screwdriver. It is listed at \$1.50.

Anti-rattlers of two different types are made by the Denver Accessory Co., Pawtucket, R. I. One of them is designed to replace the steering rod cap and act as an anti-rattler and grease cup. It sells for \$1. The other is a flexible brake rod support. The brake rod

passes through it and is held firmly but permitted to operate easily by a ball and spring retainer. It can be attached without removing the clevis and the only tool necessary is a screwdriver. The price is \$2 per set of two.

Special Tools for the Ford

For the Ford owner who likes to do the most of his own repairing the trade has provided a number of useful tools and sets of dies, wrenches, etc., designed to facilitate the work. The Frank Mosberg Co., Attleboro, Mass., is marketing a special socket wrench set which, it is stated, will fit every nut and bolt about the car. This contains ratchet socket wrench, an extension bar, universal for getting at inaccessible nuts, spark plug socket, screwdriver, bit, and nine regular pressed-steel sockets. The Ford set sells for \$5.70, packed in either a wooden or flexible fiber case.

A socket wrench set designed to reach the hard places is the Bay State, for which Geo. A. Cutter, Taunton, Mass., is sales agent. This has a quick-acting, double-ended ratchet wrench and eleven pressed steel sockets, case-hardened and nickel-plated heavy screwdriver and seven-inch extension steel shank. The sockets include a special long one for removing spark plugs and one of special design to fit the nuts on the crankshaft bearings. Price, \$4. The American Auto Supply Co., New York, has socket wrench sets ranging in price from \$1 to \$4.

A set of screw cutting dies may prevent a long wait for parts and special sets for Fords may be had. These usually include a plate

with dies for threads of the proper size and pitch for all the bolts and nuts about the car and are put up in a compact case, so that they may be carried in the tool box. One such set is made by Butterfield & Co., Derby Line, Vt. Another is made by Wiley & Russell Mfg. Co., Greenfield, Mass. It contains sixteen taps, sixteen dies, two stocks, and two tap wrenches, and may be had at \$18.50 in either a leather case or hardwood box. A special socket wrench for the cylinder head bolts is the



GARDNER REAR AXLE TRUSS

latest specialty of the Auto Parts Co. Heretofore it has been necessary to tighten them as much as possible with a wrench and finish with a hammer and cold chisel. The new wrench sells at 45 cents.

Ordinarily to remove the propeller shaft housing from the differential housing it is necessary to drive it off with a hammer, which is a tedious job and one likely to damage the

flanging. The B. & W. Ford rear housing puller is a tool designed to accomplish this removal without damage. There are two tools in a set and are simply a forked tube with a hex-headed screw threaded into it. The fork fits over the differential housing flange and a pin passes through the fork and a bolt hole in the housing, the other end resting against the rear bearing cap. When the nut is turned the tube lengthens and forces the two sections apart. The set costs \$6 and is made by the Universal Mfg. Co., Racine, Wis.

Felt gaskets and washers of the proper size and shape for the Ford engine may be obtained of N. E. Booth, Brooklyn, N. Y.

The Victor Mfg. & Gasket Co., of Chicago, is marketing complete sets of gaskets used on all models of Ford cars from 1909 to 1914 inclusive. These are identically the same gaskets as are being furnished by this company for the Ford Motor Co.

Even the brakes have been the subject of investigation by the Ford specialty makers, Ford Multibestos brake lining is made by the Standard Woven Fabric Co., Framingham, Mass. It is said to be unaffected by oil. It is made in two sizes for Fords and approximately six feet are required to line the three bands. The Royal Equipment Co., Bridgeport, Conn., has special raybestos brake and clutch linings. It also is producing an internal cam brake which may be used either as service or emergency brake. It consists of two halves which are interchangeable, made of gray iron castings, raybestos lined. These castings fit within the brake drum.

Slip Covers, Dust Hoods, Radiator Covers, Etc.

THERE are few things which set off a Ford car like natty, well-fitting seat covers and owners who wish to give their cars distinctive appearance afford a ready market for equipment

of this kind. These usually are made of waterproof, dust-colored materials, fastened with snap buttons on screw heads. The better class of seat covers have patent leather arm rests.

The Sterling Top and Equipment Co., New York, makes covers of this type for Fords with a top boot to match. The outfit sells at \$20 for touring cars and \$14.50 for roadsters. Another brand is the Lasco which sells at \$25 for the touring car and \$15 for the roadster, including the top boot to match. The Crescent Tire Co. offers covers made of mackintosh waterproofed fabric bound with leather. The covering includes the seats, top boot and doors, with pockets in the latter. Touring car sets are \$11.10, and runabouts \$7.15. Campbell waterproof seat covers are made by the Perkins-Campbell Co., Cincinnati, O. The Nathan Novelty Mfg. Co., New York, has a set of seat covers which consists of covers for back cushions and doors. The touring car set costs \$15 and the roadster \$8. Door pockets and top boot may be had extra. The Gibson Automobile Co., Indianapolis, Ind., markets a set of seat covers with which is included a scratch apron with pockets for the back of the front seat. Price, \$10.75 and \$18.

Detroit slip covers are made of unshrinkable whipcords and the complete set has eleven

pieces. They are attached with glove fasteners and are quickly removable. They cost \$17.50 for the touring car and \$14 for the runabout. They are made by the Detroit Slip Cover Co., Detroit, Mich. The Truscott Auto Supply Co., St. Joseph, Mo., supplies a set which covers all upholstery and doors as well as top boot at \$11 and \$18. The Globe Seat Cover Co., Racine, Wis., also supplies Ford covers.

London seat covers for Ford cars are made by the London Limousine Co., Hempstead, N. Y.

Hood and Radiator Covers

Hood and radiator covers prove valuable during cold weather. They make starting easy after short stops, prevent the radiator freezing, keep the engine dry, and prevent short circuiting of the ignition wiring. C. Smith & Co., Philadelphia, Pa., make a cover of this sort made of black rubber duck lined with heavy felt. Price \$5. This concern also produces a door pocket which may be attached quickly by three nails in each side driven into the woodwork. It costs \$1. Another product of this concern is a Ford tire trunk at \$6. The Nathan Novelty Mfg. Co. also supplies hood and radiator

covers in addition to its regular line of tire trunks, running board trunks, etc.

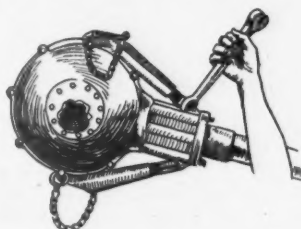
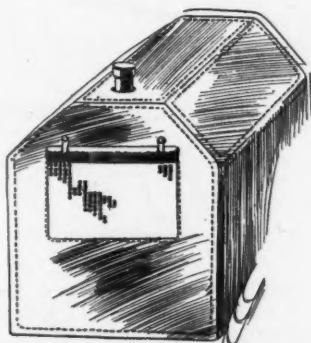
For touring, Ford owners will find it convenient to carry more luggage than can be accommodated comfortably in the car. In addition to its Ford tire trunks, the Ajax Trunk & Sample Case Co., New York, has a special rack and trunk to fit designed for this car. A new one is the running board trunk. The L. P. Halladay Co. has a suitcase or package carrier for the runningboard, which sells at \$3 per pair.

Boots for steering arms and other portions of the car are valuable in protecting them from mud and dust. These are made by the Perkins-Campbell Co., and the Nathan Novelty Mfg. Co. With these it is possible to pack the joints.

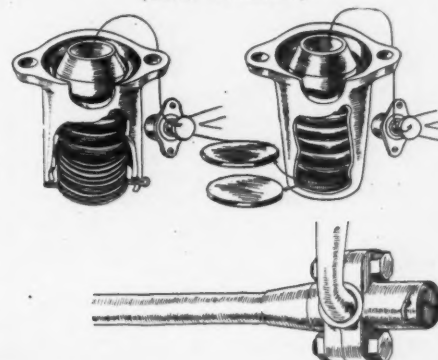
Gasoline Gauge Price Misstated

The price of the Tanner gasoline gauge made by the Modern Specialty Co., Racine, Wis., was stated in the Motor Age, issue of May 21, as \$2.50. This is an error; the gauge sells at \$1.50.

(To be concluded.)

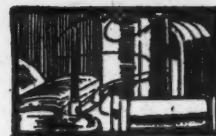


LEFT, FORD BONNET COVER; CENTER, R & W REAR AXLE TOOL; RIGHT, AUTO PARTS ANTI-RATTLER FOR RADIUS RODS AND STEERING ARM





The Readers' Clearing House



MINIMIZING EXHAUST PRESSURE Reader Believes Kinetic Energy in Escaping Gas Can Be Employed Profitably

NEW YORK—Editor Motor Age—Despite the curves from actual tests on mufflers, showing that mufflers as now used are the cause of loss of power, the writer is convinced that the day will come, if it is not already here, when the muffler will cause no loss. In my mind it is merely a matter of proper design, as my arguments herein indicate. In fact, I have been in actual touch with experiences where a micrometer on the exhaust pipe showed lower pressure with the muffler on than with the muffler cut out.

My explanation is based on the action of the gas turbine—an early type where the surge of the gas following the explosion was utilized in sucking in a new mixture which was in turn exploded and its surge used to draw in another fresh charge and so on endlessly. This proves that there is a momentary vacuum in the explosion chamber, and for the same reason there must be a momentary vacuum in the exhaust pipe of motor car engines. The problem is to so design the muffler and exhaust connections that at the instant of exhaust the surge of the escaping gas will be at its maximum thus creating a partial vacuum into which the new exhaust charge is allowed to rush.

In Fig. 1 is shown a "lump" of gas leaving a cylinder. It moves at very high velocity at first because of the high pressure acting on it while the exhaust valve is open. But as soon as the valve closes, its velocity must diminish because of the partial vacuum that will occur near the valve. I take for granted, to be sure, that the pipe and muffler are so designed that gas expansion will be cared for.

Now, by so timing the number of explosions or by so designing the exhaust apparatus that maximum surge, and dispersion into the air are simultaneous, the conditions for exhaust are ideal whether a muffler is used or not.

Where the explosions are so timed that each exhaust meets an inrush of air (which plainly does occur after the surge under improper conditions) the exhaust pressure will be a maximum and the engine efficiency will be less.

I admit that this scheme could not be very easily worked out, and perhaps it never will be for a multi-cylinder engine, but it is a fact that the partial vacuums are there, the surges are there, and their resultant losses are there. It is doubtful if engine designers have ever thought of these points, and it is for that reason that I am writing this.

If it is possible to utilize the kinetic

energy of escaping exhaust in motor car engines as in gas turbines, and if it can be effected in as simple a manner, let us utilize the exhaust.—N. G. Near.

DETERMINING CARBURETOR SIZE No Set Rule as to Instrument Necessary for Given-Size Motor

Canton, Kan.—Editor Motor Age—Why is it that some motors are fitted with 1½-inch carburetors, while others of the same or larger bore are fitted with the 1-inch size of the same model carburetor?

2—I have a roadster with a motor of 3½-inch bore, fitted with 1½-inch hard L Schebler carburetor. It is very hard to adjust so the mixture will be right and I seem to get the limit when the throttle is ¾ to ⅞ open. Would Motor Age advise using a smaller carburetor?

3—Kindly give instructions for setting the float in Schebler Model L carburetors, both 1-inch and 1½-inch size.—B. C. Hungerford.

1—This is true because in a test by the carburetor maker the motor was found to give better results with the smaller carburetor. Although the displacement of the motor is, to some extent, a guide as to the carburetor size necessary, it does not always work out in all cases that the size is in direct proportion to the displacement. For example a 3 by 4-inch motor of a certain design and make may require a 1-inch carburetor, while another motor of similar dimensions may do the work just as well with a ¾ or even a ⅝-inch. The make and type of carburetor enters into the matter also. Read the answer to L. L. Cass in the Readers' Clearing House, issue of May 21.

2—You do not state the stroke of the motor, nor the number of cylinders. Improper adjustment of the carburetor would give the conditions you speak about. It would be best to take the matter up with the Schebler company to determine the proper size instrument. Give them the make, model and size of your motor and all the characteristics of the trouble and the proper model and size Schebler carburetor will be suggested.

3—The Schebler model L has no float adjustment. The float is reset by bending the float arm until the float is 1½ inch from the top of the bowl.

INFORMATION ON DUAL SYSTEM Used on 59 Per Cent of the Cars on the Market—Cadillac Gear Ratios

Milwaukee, Wis.—Editor Motor Age—Is the dual magneto the standard?

2—Which is the best and why, fixed spark, automatic, or variable hand control?

3—What is the bore and stroke of the Studebaker four?

4—Has it an electric starter or lights?

5—Has the long-stroke motor a higher piston speed than the short-stroke motor?

6—Is not 30 miles per hour ample speed for a car not using a fourth speed gear?

7—What is the approximate r. p. m. of a Paige 4 by 5 bore and stroke at 50 miles per hour?

8—What are the Cadillac gear ratios?

9—What is the bore and stroke of the Cadillac?—Ray L. Frick.

1—The dual system is in use on 59 per cent of the 1914 cars.

2—It cannot be said which of the three systems you name is the best, because for some motors the fixed spark is considered better than the variable. The automatic refers to a system in which the spark is automatically advanced and retarded with an increase and decrease in engine speed. Some engineers believe the fixed spark is ideal for small motors, say, of under 150 cubic inches displacement, while others believe better results are obtained with the variable.

3—The Studebaker four has a bore and stroke of 3½ by 5 inches.

4—It is equipped with the Wagner electric lighting and starting system.

5—At the same r. p. m. the long-stroke motor has a higher piston speed than the short stroke.

6—Yes.

7—About 1,700 r. p. m.

8—The Cadillac has a two-speed rear axle affording six different forward speeds and two reverse. With the rear axle gears in one position the ratios are as follows: First speed, 12.20 to 1; second, 6.65 to 1; third, 3.66 to 1; reverse, 15.91 to 1. With the other set of rear axle gears in use the ratios are: First, 8.33 to 1; second, 4.54 to 1; third, 2.50 to 1, and reverse 10.87 to 1.

9—The Cadillac has a bore and stroke of 4½ by 5½ inches.

Car With Gas Knock

Montmorenci, Ind.—Editor Motor Age—I have a Rambler, model 54, with a Stromberg type A carburetor. When this car is run on low speed it will idle properly, also when the spark is advanced and throttle is opened it will run correctly. When I start on road the engine runs all right on low and second speed and in high, but when the throttle is opened suddenly a knock takes place. On a pull, it will knock by giving more gas. The moment the gas throttle is pulled back a few notches the knock leaves, but I have no power because I have not enough gas. It never knocks on low gear at any speed or no matter how heavy I pull the engine, neither does a knock take place at any other time only when I open the gas throttle quickly on the road, even on level road. Is this a carburetor knock? I have had all the cylinders off, and there are no loose piston pins, bearings, etc. The trouble must be in the carburetor, as the moment the gas is pulled down the knock stops. I have a No. 54 spray nozzle in my carburetor. Would it be advisable to put in a different size spray nozzle?—G. J. Wetschurack.

This knock is natural and is to be expected. Any engine will knock more or

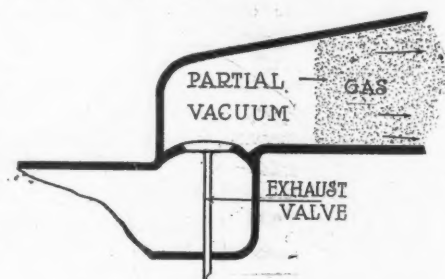


Fig. 1—Illustrating a volume of gas leaving a cylinder and at the moment the valve closes its velocity is diminished because of the partial vacuum occurring near the valve

less when laboring on a hill, particularly if the throttle is open wider when the engine labors badly. If the engine does not pull a hill on high without knocking, shift to lower gear. It may be that your case is aggravated by poor valve adjustment or valve timing or by carburetor trouble, but it is impossible to say definitely from your description of the trouble.

OPERATION OF REGULATOR VALVE

Acetylene Tank Device Described—Makers of Strainers

Janesville, Wis.—Editor Motor Age—Where can an oil strainer or filter be obtained, about the size of a gasoline trap or larger, which would be suitable and practicable for a 1912 model Krit car, to be placed in the oil line just outside the transmission?

2—How high or how deep should the oil in the crankcase of the 1912 Krit motor be kept?

3—Kindly explain the operation of the regulator valve used on Prest-O-Lite tanks to regulate the pressure in the tube from the tank to the lamps.—G. R. McLay.

1—The following, taken from the Automobile Trade Directory, are makers of strainers, and probably will be able to supply your wants: Atwood Brass Works, Grand Rapids, Mich.; Western Brass Mfg. Wks., Chicago, and M. Kinsey Co., Toledo, O.

2—The model A Krit should hold 4 quarts in the crankcase and the model K, 6 quarts.

3—This valve is connected to a Prest-O-Lite cylinder, and the cylinder needle opened one or two turns, the gas passes into the valve through the male union connection, which is provided with suitable means for guarding against the entry to valve of small particles of dust, which, if parts are not carefully cleaned, might be introduced in making up the union connection.

At the inner end of the male union seat, is fitted suitable material, with an orifice of an exact size and shape. This piece is centrally bored for the inlet valve, which valve is actuated by a push rod, action being imparted to it by the diaphragm with suitable levers and fulcrum block interposed. A small screw permits pressure adjustment. Screwing it in, increases the pressure and unscrewing it, decreases the pressure.

Carbon Causes Preignition

Memphis, Tenn.—Editor Motor Age—What is it that knocks in a motor filled with carbon or overheated, when there is no play in the bearings?

2—In a Bosch dual system, would weak magnets affect the battery's firing?

3—Why would not an eccentric sliding valve, as on a steam engine, do for a gasoline motor, if two were used in each cylinder?

Questions Answered and Communications Received

N. G. Near.....New York
B. C. Hungerford.....Canton, Kan.
Ray L. Frick.....Milwaukee, Wis.
G. J. Wettchurack.....Montmorenci, Ind.
G. R. McLay.....Janesville, Wis.
J. C. Rogers.....Memphis, Tenn.
J. B. McQueeney.....Chicago
C. H. Dietz.....Muskogee, Okla.

No communication not signed with the reader's full name and address will be answered.

4—What speed does Motor Age think a 1910 model Speedwell, stripped down for racing, should show?

5—Was this car ever in any prominent race?

6—What is the speed of the 1915 rotary valve six?—J. C. Rogers.

1—The knocking is caused by preignition. This condition causes the piston to hit against the cylinder wall just as it does when the spark is advanced too far.

2—No.

3—Modifications of this form of valve have been tried.

4—About 65 miles per hour, with the proper gears installed.

5—No.

6—About 60 miles per hour.

READER HAS PLAN FOR RACING CAR

Suggests Novel Valve Arrangement for Motor—Wants 24 Valves

Chicago—Editor Motor Age—Of late I have been reading much of the increasing number of racing cars that are being built, with four overhead valves to each cylinder. So far as I can judge, these seem to have all the inlet valves in one row, and all the exhaust valves in another row. Would it not be practicable to have inlet and exhaust valves alternating in each row, so that the two inlet valves of each cylinder are diagonally opposite to each other (and, of course, the same to be true of the exhaust valves)? Or might it not also be arranged so that the valves would be in three rows—all the inlet valves to be in one central row, and the exhaust valves to be divided into two rows on either side of the central row of inlet valves—there being, of course, two separate exhaust manifolds.

2—What would be the best arrangement of valve-operating mechanism in each case?

3—How much would be the probable cost in each case for rebuilding a six-cylinder overhead valve 12-valve engine into a 24-valve engine after each of these plans? My idea is that with the inlet valves so placed diagonally opposite each other, in connection with two-point ignition, the four-valve system and the two-point ignition would so greatly justify each other that the plan would be applicable to everyday touring cars as well as to racing cars; so great would be the gain in all-round efficiency.

4—Several months ago I read in Motor Age and other magazines that the Fay Taxicab Co., of Chicago, would, beginning with the first of the present year, use producer-gas installations instead of gasoline to operate their taxicabs; and that the engineer who was developing the apparatus was of very high standing. Was this plan put into effect? If so, with what success?

5—What other progress has been made recently along these lines?—J. B. McQueeney.

1 and 2—This would bring the incoming gas too close to the exhaust and the mixture thus would be contaminated more than if exhaust and inlet valves were grouped separately. A single overhead camshaft like the Wiedley or Harroun designs might be used.

3—The expense would be prohibitive.

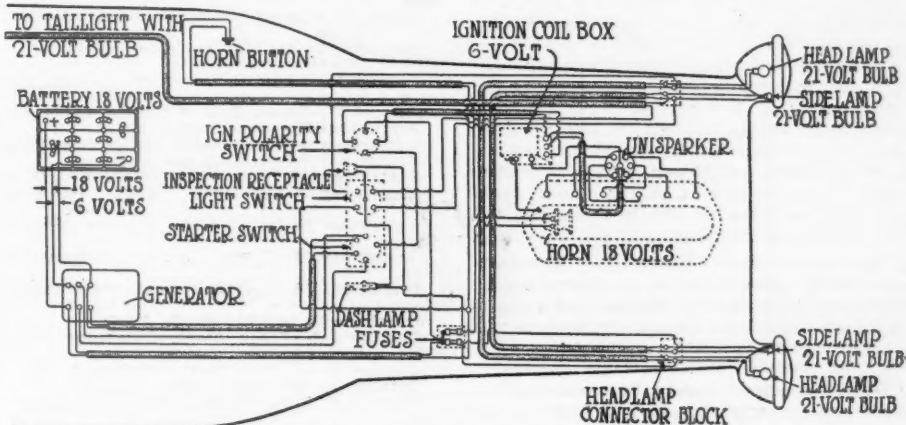


Fig. 2—Wiring diagram of the Entz system as used on Chalmers cars. The system comprises a motor-generator, battery, switch and regulating device and the feature of the installation is that it prevents stalling of the engine

You would need new cylinder castings, or at least new cylinder heads.

4—Little has been done recently on account of changes in the system.

5—Very little has been reported.

DETAILS OF CHALMERS STARTER

Entz System Prevents Motor from Stalling—Motor-Generator Used

Muskogee, Okla.—Editor Motor Age—Show by diagram the complete electrical equipment ignition, starting and lighting of the new Chalmers six-48, model 26, showing the location of the different instruments.—C. H. Dietz.

The wiring diagram of the Chalmers model 26 is shown in Fig. 2. The system used is called the Chalmers-Entz, and comprises a motor-generator battery, switch and regulating device. The feature of the installation is that it prevents the gasoline engine from stalling, even when the car is in gear.

For all normal driving the dash switch is left in the position at the extreme right, or, in other words, the starting system is constantly connected with the motor. For constant driving at speeds in excess of 30 miles an hour the dash switch should be moved to the middle position in the slot. In this position the ignition of the motor is still operative, but the generative system of the starting system is cut out so that the battery no longer is being charged.

When there is a tendency for the engine to stop the electric motor automatically picks up and turns the engine over until proper firing occurs.

When the dash switch is thrown to the on position, current flows from the battery to the motor-generator, which as a motor revolves at about 100 r. p. m. As soon as the motor attains a speed of approximately 600 r. p. m., 6 to 8 miles per hour, car speed, the direction of the current, due to the way the switch is connected to fields and armature is reversed and the electrical machine then becomes a generator, which in turn charges the storage battery. In the illustration in Fig. 2, showing the wiring of the Entz system, the voltages of the lamps are shown. In the case of the headlights, the small bulbs incorporated are also shown.



From the Four Winds



RACES for Oklahoma State Fair—Louis Disbrow and the Jay-Eye-See will feature the motor car races to be held in connection with the Oklahoma state fair on the 1-mile dirt track at Oklahoma City October 2 and 3.

Racing Circuit is Formed—A motor car racing circuit comprising Lacey, Wash., Portland, Ore., North Yakima and Vancouver, B. C., has been arranged under the management of Robert A. Hiller of Seattle. The Lacey meet will be held on May 31 and the Vancouver meet on Dominion Day, July 1. All licensed A. A. A. drivers of the Pacific Northwest have been invited to enter.

Iowa Buys 400 Cars Daily—Iowa is now buying 400 new motor cars every day. The records in the office of the secretary of state show that 80 percent of the cars now being registered are new ones and that the average registration for each day is 500. This makes 400 new cars a day for the state. The general complaint among the distributors is that they cannot supply the demand.

Marking Routes to California—The Automobile Club of Southern California have just placed an order for 1,000 posts and 2,000 signs to direct traffic toward southern California from eastern points. This is one of the first steps in preparation for the rush of motorists to California in 1915. On each sign will be the name of the club and the insignia of the route. The first lot ordered will be placed in Arizona.

Blue Grass Road in Good Shape—Every mile of the Blue Grass road, one of Iowa's organized highways, has been designated as a part of the main county highway system of the state, according to reports made by county chairmen at the annual meeting held May 22 at Ottumwa. Four-fifths of the bridges and culverts are of permanent construction, and plans were made to make all such structures permanent within 2 years.

Iowa Little Glidden in July—Hal R. Wells of Des Moines, holder of the trans-Iowa and Chicago-Des Moines records, was chosen last week as pathfinder for the Iowa little Glidden which will be held this year July 1, 2 and 3. Sioux City and the race meet there will be the objective point. Clear Lake, Storm Lake, Spirit Lake, and Lake Okoboji will be visited enroute. Mr. Wells will make the pathfinding tour in a car of his own make. He expects to map the route early in June.

Trees for Old Trails Highway—Five carloads of young fruit trees, the gift of a southern Missouri nursery and orchard company, are being planted along the Missouri part of the National Old Trails highway. The gift comprises fifty thousand apple, peach, plum, pear and cherry trees. They are being distributed evenly in the following counties: Audrain, Boone, Lafayette, Monroe, Linn, Lincoln, Lewis and Macon. The only cost to the state is the freight, as the nursery company, in addition to giving the trees, has provided expert supervision of their planting.

New Motor Club Formed—The Metropolitan Motor Association is the latest organization to be formed in Boston. At a meeting last week Hon. Samuel L. Powers was chosen president; Ex-Mayor Charles E. Hatfield of Newton, vice-president; Arthur F. Clarke, treasurer; James Fortesque, secretary and assistant treasurer. The club is not to have any social features, its main object being to secure better highways and good motor laws. Many men prominent in public and private life have joined and a

board of directors will be chosen later. Temporary headquarters will be at 93 Massachusetts avenue, Boston. The new organization will be affiliated with the A. A. A. and the Massachusetts State A. A.

Aged Motorist Leaves for Coast—J. S. Bowen of Grinnell, Ia., 60 years old, is off on a motor tour to the Pacific coast. He started from Grinnell last week and is traveling by himself in a Buick. He plans to take the trip by easy stages and see all the sights enroute.

Congress May Build Highway—It is reported that the congressional committee on Indian affairs, will appropriate \$1,000 to investigate the claims of the Twin Cities-Aberdeen-Yellowstone Trail Association for \$50,000 to build a road and acquire the right-

of-way across the Standing Rock Indian reservation in South Dakota. The committee has some doubts on what to base the appropriation for buying the site and making the road, but will make a report in the fall.

Another Club for Indianapolis—A new motor organization, known as the Indianapolis Automobile Club, is being formed in Indianapolis. The club has been incorporated under the Indiana voluntary association act without capital stock. The directors are Frank S. Widner, R. E. Gregg, W. H. Higgins and E. B. Francis.

Dallas Motorists May Lose Cars—Of the 6,242 motor cars in Dallas, Tex., according to the city's tax rolls, more than one-half have not been rendered by the owners. The city charter provides that rendition must be made by April 1, but the period has been extended to motor car owners by City Tax Assessor and Collector George H. Moore. Unless the owners render their cars immediately an arbitrary value will be placed on them. The value of the unrendered motor cars in Dallas is estimated at \$500,000 by the city authorities.

Favors Return to Toll Gates—Colonel Frank W. Buffum, state highway commissioner of Missouri, is urging the re-establishment of the old-fashioned toll gate on some of the Missouri roads to obtain additional revenue for the permanent maintenance of county highways. He is now in Ralls county asking the county court to go back to the old system used when the roads in that county were owned by a corporation. Colonel Buffum says the toll system has been found very satisfactory and productive of good results. It affords an opportunity, he says, to reach the transient who uses the road but who would not be reached by a tax.

10,000 Men to Work on Roads—State Highway Commissioner James R. Marker will immediately start plans for putting 10,000 men to work on Ohio state roads, improving old ones and building new ones. This action will follow the ruling handed down last week by Attorney General Hogan that it is unnecessary for the state commissioner to wait until September when money raised under the Hite road law is in the state treasury before letting contracts. The work will therefore be begun immediately and 9,300 miles in the state of Ohio will be improved. Marker says he will rush the work in practically every county in the state and approximately \$4,000,000 will be spent in road work.

Make Plowing a Joy-Ride—Medford, Ore., claims to have more motor cars per capital than any other district in the United States. According to state statistics there are approximately 1,200 motor vehicles in the county. However, this is not a community of joy-riders and runabout farmers. The ranchers of the Rogue river valley are making their motor cars pay for their upkeep. The Carpenter brothers of Veritas orchards, Harvard men, were pioneers in the movement. In their own ranch work these former university athletes decided that plowing could be made a joyride forever. They secured a tractor, which they attached behind their Buick, and now they speed through the orchard with a five-disc plow, completing six and seven acres a day with ease. The operation of attaching and unattaching the tractor requires but 10 minutes. The cost of plowing has been reduced to 50 cents an acre in addition to the saving in labor and the care and expense of horses.

Coming Motor Events

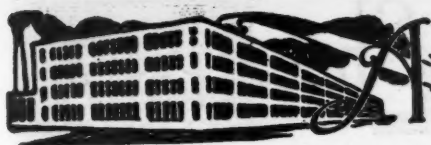
SHOWS AND CONVENTIONS

June 23-26—S. A. E. summer meeting, Cape May, N. J.
September 26-October 6—Berlin show.
October 17-24—Show, Pittsburgh, Pa.
October 16-26—Paris show.
November 6—Olympia show.
November 9-14—American Road Congress, Atlanta, Ga.

CONTESTS

*May 30—Indianapolis 500-mile race.
May 30—New York track meet.
May 30—Track meet, Providence, R. I.
June 1—Florida cup race, Island of Sicily.
June 1—Reliability, Philadelphia, Pa.
June 6-7—Track meet, St. Louis, Mo.
June 10-11—Isle of Man road races, Great Britain.
*June 18—Hill climb, Uniontown, Pa.
June 19—Track meet, Boston, Mass.
June 20—Interclub reliability, Philadelphia, Pa.
June 27-July 4—National touring week.
June 29-July 2—A. A. A. National Reliability tour.
June 30—Track meet, Sioux City, Ia.
July 3-4—Road races, Tacoma, Wash.
July 4—French grand prix, Lyons.
*July 3-4—Montamara Festo road races, Tacoma, Wash.
*July 4—Three hundred mile race, Sioux City, Ia., speedway.
July 4—Track meet, Providence, R. I.
July 4—Hill climb, Richfield Springs, N. Y.
July 17-18—Speedway races, Seattle, Wash.
July 18-19—Speedway races, Seattle, Wash.
July 30, Aug. 1 and 3—Beach meet, Galveston, Tex.
July 25-26—Belgium grand prix road races.
August 15—Le Mans cyclecar grand prix race.
July and August—French army truck subsidiary trials.
August 2-9—Six day cyclecar reliability in French Alps.
August 16—Coupe Internationale; light car race, Le Mans.
August 17—Grand Prix of France, Le Mans.
August 21-22—Road races, Elgin, Ill.
September 5—Track meet, Milwaukee, Wis.
September 6-7—Italian grand prix.
September 7—Track meet, Providence, R. I.
September 9—Speedway races, Pomona, Cal.
September 9—Road race, Corona Beach, Cal.
September 14—Track meet, Milwaukee, Wis.
September 18-19—Track meet, Hutchinson, Kans.
October—Gallien hill climb, Paris.
October 2-3—Track meet, Oklahoma City, Okla.
October 2-3—Track meet, Trenton, N. J.
October 9—Speedway race, Chicago.
November 8-11—Track meet, Shreveport, La.
November 15—Kerosene motor tests, Paris, France.
November—El Paso-Phoenix road race.

* Sanctioned by A. A. A.



Among the Makers and Dealers

J. M. CASE with Abbott-Detroit—Julian M. Case has been appointed manager of advertising and sales by the Abbott Motor Car Co., Detroit, Mich. Mr. Case formerly held a similar position with the Regal Motor Car Co.

Changes in Federal Motor Truck Co.—The Denby and Drake interests in the Federal Motor Truck Co., Detroit, have been acquired by the present stockholders and distributed pro rata. Garvin Denby has resigned as vice-president and M. L. Pulcher, the present general manager, has become vice-president as well.

Fire at Moon Factory—Fire that started in the Japan tank in the finishing shop of the Moon Motor Car Co. last week caused damage of about \$40,000 which is fully covered by insurance. The fire was confined to the finishing room but water and smoke caused the monetary loss to be large. Many machines were in the shop, but speedy removal held the loss down.

Franklin increase of 61 percent—According to officials of the Franklin Automobile Co. of Syracuse, N. Y., business has increased 61 percent since October 1, 1913, when the company discontinued the manufacture of all models except the small six. The increase, moreover, has been cumulative, the last 3 of the 7 months since October showing an increase of 93 percent.

Rogers Joins Canadian Company—J. E. Rogers, until recently assistant general sales manager of the National Cash Register Co., Dayton O., has joined the Russell Motor Car Co., Toronto, Can., as assistant general manager. Mr. Rogers will also be elected to the directorship made vacant recently by the death of the late Senator Cox, and become second vice-president of the company.

New Oil Company Marketing Products—The Wisconsin Oil and Supply Co., Milwaukee, organized recently with \$15,000 capital, has established headquarters and tanks at 2609-2611 Elm street and is marketing oils and greases under the trade name of Wosco. P. J. Klumb has been elected president; C. Weckmueller, vice-president, and H. H. Gerlach, secretary and treasurer.

Case Accepts Compensation Act—The J. I. Case T. M. Co., Racine, Wis., employing in excess of 5,000 men in Wisconsin, has elected to come under the provisions of the Wisconsin workmen's compensation act or industrial insurance law. The Case company is one of the few large industrial concerns in Wisconsin which did not accept the act last year. Under the law workmen are assured stated benefits and damages for accidents and deaths. All lawsuits are avoided.

To Investigate Electric Systems—At a meeting of the Electric Division of the standards committee of the Society of Automobile Engineers held last week a sub-committee was appointed to report on designs for the installation of electric lighting, starting and ignition systems. It was decided at the meeting to adopt a time temperature test on insulation used in car wiring.

Truck Company Moves from Racine—The machinery and equipment of the motor truck shops of the Piggins Motor Truck Co. at Racine, Wis., is being shipped to Reedsburg, Wis., for installation in the plant now being established by the Reedsburg Motor Truck Co., organized recently with \$100,000 to manufacture the Piggins internal spur gear drive truck under the name of

Reedsburg. It is hoped to produce two trucks a week at the start and the first cars are expected to come through by July 1. E. M. McNab, formerly designer for the Piggins company, is general superintendent of the new company, which is backed by Reedsburg capital almost exclusively.

Moreland to Exhibit at Frisco Fair—The Moreland Motor Truck Co. of Los Angeles has just signed for a large floor space to exhibit its trucks at the Panama-Pacific exposition. This is the first truck manufacturer to take space in the world's fair of 1915.

Rhineland Machine Works Moved—The Rhineland Machine Works, formerly located at 141 West Forty-second street, New York, have moved to 1737 Broadway. The new location gives 3,000 square feet of floor space, which enables the company to carry a complete stock of all sizes of ball bearings and all sizes of A. V. shock absorbers.

Plans for Ford Cleveland Branch—The preliminary drawings for the building of the Ford Motor Co.'s assembly plant at Euclid avenue and East One Hundredth and Seventeenth street, Cleveland, have been prepared and call for a four-story fireproof building, 157 by 125 feet in size. Later there will be erected another building in the rear of the first unit that will extend to East One Hundredth and Seventeenth street and the tracks of the Belt Line railroad will enter the second floor of the building. The first building,

Recent Incorporations

Boston, Mass.—Fenway Motors, capital stock, \$10,000; incorporators, G. H. McCaffrey, A. L. Stevenson, B. C. Parsons.

Camden, Me.—Camden Auto Co., capital stock, \$5,000; incorporators, T. E. Gushie, G. W. Achorn, H. P. Pendleton.

Cincinnati, O.—Hunter-Dammel Motor Car Co., capital stock, \$5,000; to deal in motor cars; incorporators, H. Hunter, A. W. Dammel, H. Koppke, J. L. Meyer, L. H. Nathan.

Danbury, Conn.—B. & Roller Bearing Co., capital stock, \$100,000; incorporators, Lewis Helm, J. H. Roth, Wm. C. Barrett.

Louisville, Ky.—Republic Vulcanizing & Welding Co., capital stock, \$5,000; incorporators, A. L. Roll, C. A. Tschanz, J. W. Roll.

Milwaukee, Wis.—Milwaukee Steel Products Co., capital stock, \$25,000; to manufacture motor car engine parts; incorporators, A. R. Marggraf, E. M. Dougherty, N. Kles.

Milwaukee, Wis.—Solid Brass Works, capital stock, \$10,000; to operate brass foundry; incorporators, E. J. Nickey, W. J. Morgan, B. F. Saltzstein.

Nashville, Tenn.—Nashville Tire Co., capital stock, \$10,000; incorporators, C. Schoffner, W. H. Blackwood, R. C. Wallis, L. M. Hitt.

New York—Dinshah Sales Co., capital stock, \$200,000; to manufacture and deal in engine testers; incorporators, A. L. Pinscoffs, J. M. Boteler, A. E. Gunn.

New York—Central Auto Supply Co., capital stock, \$5,000; incorporators, T. C. Gorman, F. Gorman, E. Emerson.

New York—Park View Garage, capital stock, \$1,000; incorporators, A. Enock, A. Morris, D. Grimberg.

New York—Auto Truck Garage Co., capital stock, \$50,000; incorporators, A. G. Brach, H. J. Benjamin, H. B. Embler.

Reedsburg, Wis.—Reedsburg Motor Truck Co., capital stock, \$100,000; to manufacture commercial vehicles; incorporators, E. N. McNab, E. Montgomery, E. Thom, J. Seamans.

Springfield, Mass.—Knox Motors Co., capital stock, \$2,500,000; incorporators, H. G. Fisk, E. O. Sutton, C. H. Beckwith.

Watertown, N. Y.—Barter-Longtin Auto & Cycle Co., capital stock, \$5,000; motor car business; incorporators, R. Barter, M. Barter, W. Longtin.

Wausau, Wis.—Wausau Abrasives Co., capital stock, \$50,000; to manufacture discs and wheels for grinding machines; incorporators, R. E. Chartier, P. W. Sawyer, J. K. Sawyer.

with a frontage of 157 feet on Euclid avenue, will have a salesroom and general office in the front of the first floor, with the garage and service station in the rear. All the upper floors and the space in any further buildings that may be erected will be used for assembling.

To Sell Used Packards—C. M. Doty, who has been with the Packard Motor Car Co. of New York for the past 10 years, will resign from that company June 1 to become president of the Doty-Demos Co., Inc., 621 West Forty-second street, New York. This company was organized recently to do a general repair and used car business, specializing in Packard cars.

Set Date for Convention—Owing to the greatly increased interest generally evident in electric vehicles, and the great volume of work to be disposed of, 3 days will be allotted to the fifth annual convention of the Electric Vehicle Association which will be held in Philadelphia, October 19, 20, and 21. Heretofore, Electric Vehicle Association conventions have been confined to 2 days, and it now seems that difficulty will be experienced in crowding into even 3 days the work of the convention.

Spring Company at Coraopolis, Pa.—Officers of the Standard Spring Co. have selected Coraopolis, Pa., as the site of their factory and are now erecting a plant on a two-acre tract of land there. It is expected that the building will be ready for occupancy July 1, when 150 men will be employed. The company is backed by Pittsburgh capital, and has elected the following officers: H. R. McMahon, president; J. M. Schoonmaker, vice-president, and Henry B. Darlington, secretary and treasurer.

Preparing to Make Beijer Truck—The Beijer Hydraulic Transmission Co., organized at Stevens Point, Wis., several months ago by Arthur A. Beijer, designer and inventor of a gearless transmission system for motor cars and trucks, has perfected its organization and is preparing to engage actively in manufacturing. The officers are: President, N. A. Week; vice-president, James Mainland; secretary and treasurer, C. S. Orthman; superintendent and manager, A. A. Beijer. The stock is owned by Stevens Point business men.

Has New Four-Wheel Drive—William Besserdich, designer of the four-wheel-drive motor truck and one of the founders of the Four Wheel Drive Auto Co., Clintonville, Wis., has disposed of his interest in the concern and it is said he is now negotiating with Pacific coast capital to establish a works for the manufacture of a new four-wheel-drive car in which the power is applied direct to each wheel instead of by the double propeller shaft and differential system of the present car. Mr. Besserdich has established a small experimental shop in Clintonville and will take the truck to California as soon as the model is completed.

Saxon to Christen Lincoln Way—Topping its run of 30 consecutive days, the 135-mile-a-day Saxon is to be the first car to officially christen the Lincoln highway. Announcement has just been made by President H. W. Ford of the Saxon Motor Co. that this machine will start the last week of May on a transcontinental run along the Lincoln highway from New York to the Pacific coast. This car, which has just completed its 4,050 mile trip in Detroit, is said to be in as good shape now as before it started.

The Motor Car Repair Shop

EVERY motorist who takes a pride in his car wishes to have the motor operate quietly at all times and when the slightest knock or slap develops he attempts to discover the faulty part and correct it immediately. Sometimes it is a difficult matter to decide just where a knock is located and just what part is causing it, and it often happens that although the knock is clearly heard in front the exact spot cannot be found. Some owners are at a loss to know just what might cause a knock into a motor and for this reason some of the common causes will be discussed here.

If a slight tapping sound is heard the driver, in nine-tenths of the cases, looks to the valve tappets and even if these are properly adjusted he will adjust and readjust until the sound disappears. This is not right. Find out first where the knock is located, then what is causing it, and lastly the remedy. Some owners are able to tell by feeling where there is a loose part, while others depend upon the sense of hearing. A third class experiment until they find the loose or mis-adjusted part. In the case of the tapping sound, the valve tappets are not always to blame. It occurs very often that the push rod is loose in its guide and every time the cam strikes the roller or flat bottom, as the case may be, the push rod will be thrown against its guide. Shimming up the guide is a good remedy.

A valve stem guide when worn excessively permits the valve to work side-

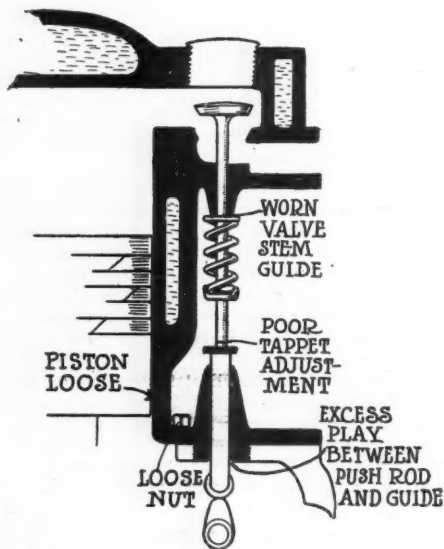


FIG. 1—PLACES TO LOOK FOR A MOTOR KNOCK

Although not all are shown above, most of the common motor noises and knocks are caused by either poor tappet adjustment, a worn valve stem guide, play in push rod guide, a loose piston or worn cylinder or loose cylinder nuts. Any of these will cause the engine to knock and they should be remedied immediately to prevent further complications.

Common Motor Noises

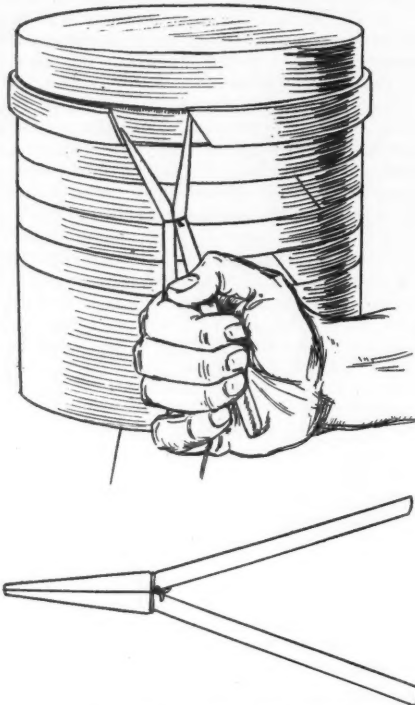


FIG. 2—A HANDY RING REMOVER

A simple piston ring remover may be made as shown above, of either metal or hard wood. The wire binding at the end of the jaws should leave a little slack for the movement of the arms. The upper illustration shows how the ends of the jaws are placed between the ring ends and the latter spread apart.

wise and thus cause a tapping sound. In the case where the guide is worn diagonally the valve will not seat properly and misfiring sets in. If the valve sticks in the guide not only will the motor misfire, but there will be a knock every time the valve is thrown to its seat by vibration of the motor.

A loose piston or a worn cylinder will cause a knock to be heard and very often this sound is similar to that heard when the flywheel is loose, which sounds like the pounding of a hammer on some hard wood. Very few motorists inspect the cylinder nuts to see that they are tight. Although it is rare, these nuts may become loose and permit the cylinder to rock. End play in the magneto or pump shaft will cause a knock to be heard and often the coupling may be loose and give a similar sound, and in some cases a disagreeable rattle.

The wrist pin bearing in the upper end of the connecting rod may become worn and play may develop at the lower rod bearing, in either case a loud knocking will be heard which becomes more intense as the motor speed is increased. A good test for a loose bearing is to open

the throttle wide for a second and then suddenly close it. The knock will be heard distinctly the moment the throttle starts to close. Lack of proper lubrication causes most of the worn-part knocks which are heard, while many come from natural wear. The timing gears, for example, run in a bath of oil and yet, in time, the teeth become worn and with the excessive backlash or play a rattling and sometimes knocking is heard.

A Handy Piston Ring Tool

Many owners who do their own repair work find it difficult to remove the piston rings without breaking them, and find it equally difficult to replace the rings. Nearly all shops have a ring remover of some sort, which operates like a pair of scissors, except that the hand end moves in the opposite direction for operation. In an illustration on this page is shown a very simple ring remover which may be made of wood or metal in a short time. It consists of two pieces, each shaped so as to form an angle of about 150 degrees. A piece of wire is bound around the parts, as shown, and a little slack given so as to permit the jaws to open. The ends of the remover are placed between the ring ends and the grips of the device brought together, as the illustration in Fig. 2 shows. This spreads the ring and it may be lifted easily over the piston.

Pouring Liquid from a Can

In order to prevent liquid, being poured from a can, from splashing, it is suggested that the opening be at the top when the can is tilted, as shown at 3 in Fig. 3. When held as at 2 in the same illustration the liquid will splash excessively.

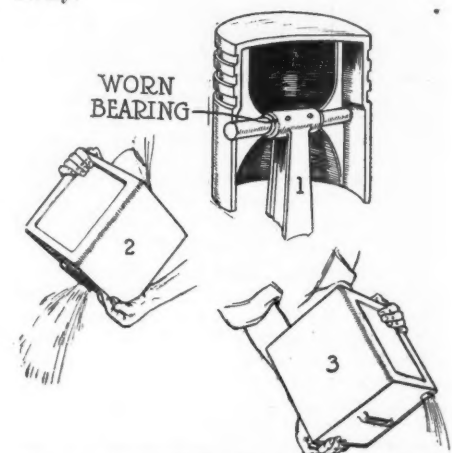


FIG. 3—A USEFUL HINT ON POURING LIQUIDS FROM CANS

The upper illustration shows another cause of motor knock which is caused by a worn upper connecting rod bearing. Sometimes the wrist pin set screw drops out and allows the pin to turn, thus developing play between it and the piston. The lower illustration shows at 3 the right and at 2 the wrong way to pour oil or gasoline from a can.

**Baker
Electrics**



Comparison Tells

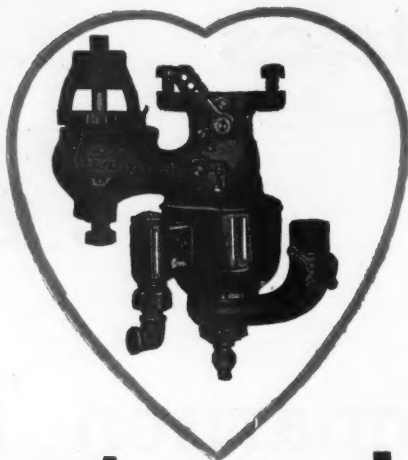
Compare a three or four year old Baker with any other electric of equal age. Then you will understand why representatives of every other well known electric have acknowledged that they would rather take a second-hand Baker in trade than any other electric on the market. Better value after years of actual service certainly indicates better value when new.

Three stately Broughams, a beautiful new Coupe, and an open two passenger Roadster comprise the new Baker Electric line. As for features, you can offer anything that is desirable—shaft drive with worm gear in one car; with bevel in another; front drive, rear drive or double drive; lever steer or wheel steer; all combined with unusual beauty and recognized excellence of design.

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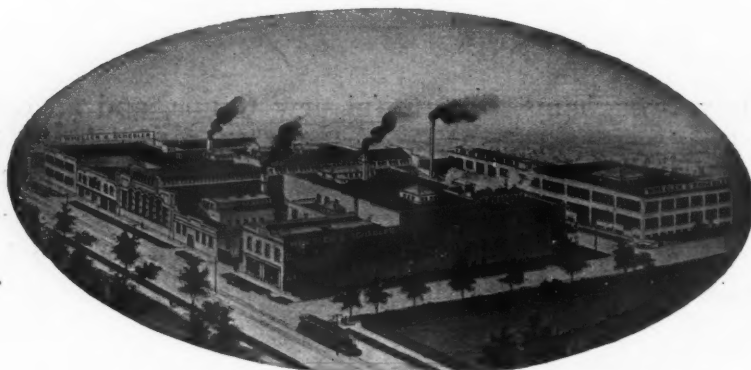


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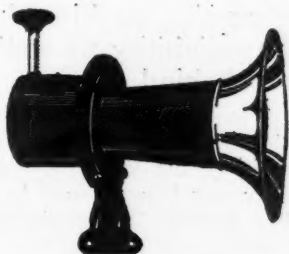
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Interstate Electric Co.
Reinhard Bros. Co.

Manufacturers' Supply Co.
Weinstock-Nichols Co.
Pennsylvania Rubber & Sup. Co.
Wheeler & Schebler
Wheeler & Schebler
Fairbanks, Morse & Co., Ltd., London, England
Canadian Fairbanks-Morse Co. (All principal Canadian cities)

Fred Campbell
W. J. Connel
Equipment Co.
Elyea-Austell Co.
J. C. Nichols
Weinstock-Nichols
St. Louis, Mo.
Boston, Mass.
Kansas City, Mo.
Atlanta, Ga.
New York City
San Francisco

Put Hand Klaxons on the **TAXI-CABS** in your town on 30 days' trial

A suggestion to Klaxon Dealers



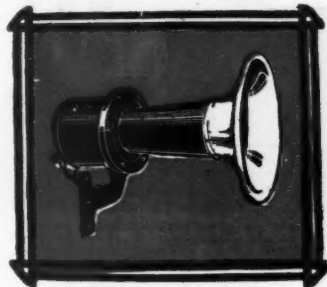
THE HAND KLAXON \$10

The Hand Klaxon is loud. It is sharp. It is sure. It is different from any hand signal you have ever heard.

TAXI-CABS have to "get there." Often in a hurry. And there's nothing more exasperating to both passenger and driver than to have to stop and "honk" while the wagon or car or man ahead gets out of the way.

The feeble squawker is worse than useless. Every taxi driver knows this. And every taxi owner—who seeks to give his patrons better, quicker service—will be interested in the Hand Klaxon.

A month's trial and he will never give it up.

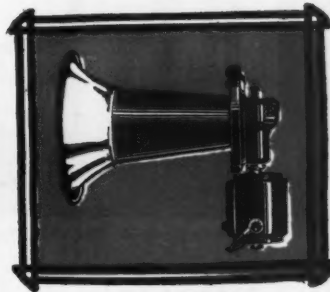


KLAXONET

Lovell-McConnell Mfg Company Newark, N.J., U.S.A.

KLAXON

"The Public Safety Signal"



KLAXON

This advertisement planned, written and set up entirely in the Klaxon Factory. Type composition by the Klaxon Press with "Klaxon" type especially designed by Goudy.

When Writing to Advertisers, Please Mention Motor Age.



RECORD MAKING NATIONAL—500-mile International Sweepstakes Race, Indianapolis Motor Speedway, May 30, 1912. Time 6:21:06. Average 78.72 miles per hour, lowering record by 4.11 miles per hour. Actual running time 81.72 miles per hour. The National was not entered in 1913, and although a foreign car won the race the National record stands supreme. The National is not entered this year.

The National's Performance Remains the most Significant to Car Buyers

THE *National* that won the 500-mile race is made almost entirely of *stock parts*. The *National* that still holds this international record is practically a *stock car*. It is built after the time tried *National* principles.

It was *not* a special speed creation entirely foreign to the regular machines built and sold. Its performance is significant because it proves the reliability as well as ability of its builders. It proves the supremacy of the *factory* behind the car. It warrants your confidence in designers and manufacturers.

The builders of the *National* put *National* engineering principles into the white heat analytical test of this international race. When the *National* came out, in sound condition, the victor, it was a triumph for the *National's* manufacturing methods. Here is the reason why you benefit most by the *National's* success. We profit by our racing experiences; our victories live forever in the character of the *National* car you drive.

Where can you benefit by a factory that enters an *entirely different car* in the race than what it builds and sells? And remember the outcome of this 500-mile race will in no way change the *fact* that the *National* is still the *Stock Car Champion*.

Write for Illustrated Catalog N

National Motor Vehicle Company
Indianapolis, Ind.



HERE IS THE REAL VICTORY BUT UNSEEN—THE VICTORY OF THE NATIONAL FACTORY EVERY DAY

Make the Man Show You the Battery'



In addition to the tires, speedometer, and other accessories on your new car, don't fail to investigate the Storage Battery furnished with your Electric Starting and Lighting System.

No other part of your car will afford you the infinite comfort and satisfaction to be derived from the use of a good electric system.

But the Storage Battery is the vital part, the actual heart of the System, the one element that insures its success or its utter failure.

Be sure, then, that the battery you get is right—don't overlook its importance.

And remember, if your battery is an **ELBA** it is the one that has been tried, proven and adopted by the great majority of car manufacturers.

A few, very few, manufacturers, have adopted other batteries, because they were cheaper, but you can have a reliable **ELBA** if you insist upon it.

ELBA Willard Storage Battery Co., Cleveland, Ohio **ELBA**

New York Branch: 136 W. 52nd St.
Chicago Branch: 2241 Michigan Ave.

Indianapolis Branch: 318 No. Illinois Ave.

Detroit Branch: 736-740 Woodward Ave.
San Francisco Branch: 821 Monadnock Bldg.

SERVICE STATIONS IN ALL PRINCIPAL CITIES IN THE UNITED STATES, CANADA AND MEXICO

(102)



THE UNANIMOUS DECISION

Of automobile dealers and motorists throughout America is—that the “Gibson Quality” line of motor accessories is the best that can be obtained in any market.

Each accessory in this immense line is guaranteed absolutely—“satisfaction or no sale.” The reputation of the largest accessory house in the world is back of each article sold under the name of “Gibson Quality.”

For years this company has stood for square, upright, conscientious dealings. Its reputation has been built upon QUALITY—SERVICE—and FAIR TREATMENT. The fact that we now serve over 6,000 dealers in America—that our business is steadily increasing—and that our facilities are constantly being increased in order to be able to handle this added business strictly according to the standards of “Gibson Service”—is ample proof of our integrity and of our ability to serve YOU with the utmost satisfaction.

The accessories shown on this page are simply a representative few of the many thousand items carried in the most complete and up-to-date accessory stock in America. We serve the dealer only, and we have what you want—will get it—or it isn't made.

Have you received a copy of our 1914 catalogue?

Gibson Automobile Company

236 Automobile Row
Indianapolis



There's no leak proof ring but the **LEAK-PROOF** Ring — insist



Boring and Turning the Casting

This is the first operation in the manufacture of the **LEAK-PROOF** Piston Ring. These pot castings are made of special Processed Gray Iron from a formula perfected after many years of experiment. This metal is wonderfully tough and close grain and possesses great natural elasticity—is soft enough to take the wear from the cylinder, yet the rings made from it will outlast the motor. These castings before being formed into rings are allowed two weeks' seasoning to relieve the strain that is peculiar to cast iron. The micrometer held by the operator checks the accuracy of the cutting tools.

LEAK-PROOF Piston Ring quality is built from the ground up—the same standards in carefulness and accuracy are followed throughout.

Power Depends on Piston Rings

Full power—no half measure—*all* the power contained in every ounce of gasoline in your tank.

Unfailing power for the hill climb—rough roads—heavy going. Strong and steady motor service all day—day after day.

It depends on the piston rings. Full power can only follow perfect compression—and such compression requires the use of



Piston Rings

MADE BY McQUAY-NORRIS MFG. CO.

The only piston ring that is effectively gas-and-oil-proof because of its sealed openings and the equal and sustained bearing it obtains on the cylinder.

The superior quality of the metal used in the **LEAK-PROOF** Ring—the strength and simplicity of its design—the careful testing it undergoes for flaws—the accuracy of its finish—these are the reasons why it is the most durable, economical and efficient piston ring. Made in all sizes—easily adjusted.

Send for Free Booklet—

It tells all about piston rings and why you should equip your engine with the **LEAK-PROOF**. How it will pay you in fuel economy and prolonged motor life. Write for it.

“Ask the User”

In Use on
Over 200,000 Automobiles
and Motor Boats



Sold by all up-to-date
dealers, garages, repair shops
and marine stores

Manufactured by

McQUAY-NORRIS MANUFACTURING CO., Dept. M, ST. LOUIS, MO.

Branch Offices

New York—1919-29 Broadway at 64th St.
Pittsburgh—7620 Tloga St.
Kansas City—513 New Nelson Bldg.

Chicago—Suite 718 Michigan Blvd. Bldg.,
Michigan Ave. & Washington St.
San Francisco—164 Hansford Bldg.

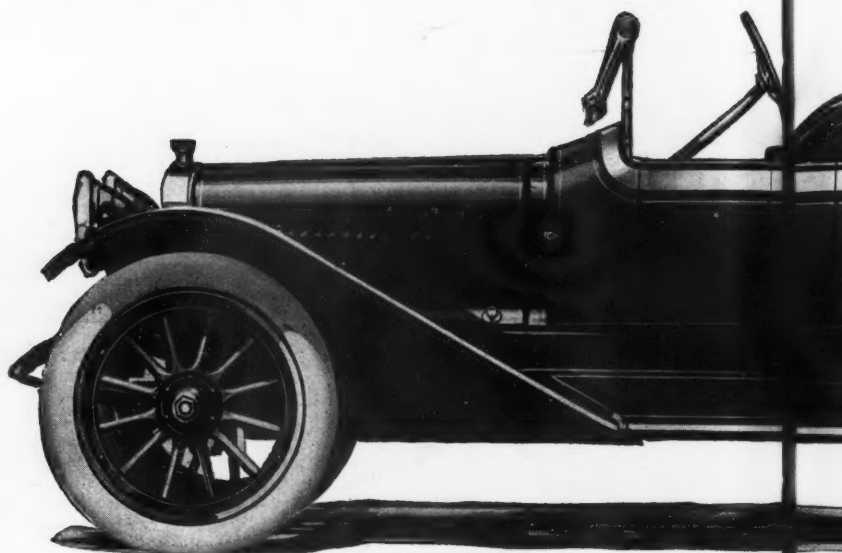
Los Angeles—224 Central Bldg.
Canada—W. H. Banfield & Sons, No. 120
Adelaide St., West, Toronto.

1-A

Look for the name **LEAK-PROOF** stamped on the Ring

When Writing to Advertisers, Please Mention Motor Age.

DANN OIL CUSHION *Standard* on **WINTON**



After exhaustive tests, extending over a number of months, the engineers of The Winton Motor Car Co. of Cleveland, Ohio, demonstrated to their own satisfaction that the DANN Oil Cushion Spring Insert was indispensable to their standard equipment. And the Winton Company is one of the most CONSERVATIVE builders of motor cars in the world!

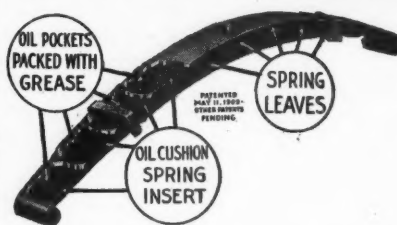
It saw in DANN Insert a device which was revolutionizing spring construction—a device that was a year ahead of the times—a device that every quality car would have to come to within the next

few months if it hoped to keep pace with the best engineering practice. The action taken by the Winton Company is but an indication of the coming STANDARDI-

ZATION of the DANN Insert in automobile construction.

DANN Insert at the present time is being tried out on the test cars of five of the best known automobile manufacturers in this country. It is not at all presumptuous to prophesy at this time

that every worth-while car exhibiting at the New York and Chicago Automobile Shows in 1915 will be STANDARDLY equipped with DANN Insert.



"Oil Cushionize Your Springs!"

Dann Oil Cushion Sp

2252 Indiana Avenue,

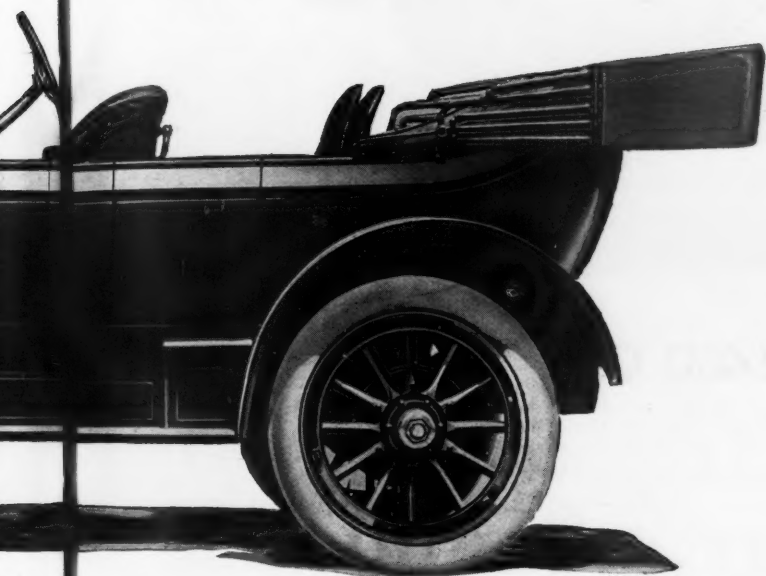
The INSERT OF TEN

SPRING INSERT

Equipment

the

SIX



Car manufacturers see the need of it — motorists are demanding it. DANN Insert is the first satisfactory solution to the spring problem ever offered.

It provides PERFECT and PERMANENT spring lubrication. It retains lubricant INDEFINITELY between spring leaves. It betters the riding qualities of ANY car by making squeaky, dry and rusty springs impossible. It adds to car life by absorbing mechanism-killing vibration. It decreases tire wear. It adds to

a spring's shock absorbing qualities by practically doubling the number of its leaves.

DANN Insert is a thin, perforated strip of specially compounded metal, designed to be

inserted from tip to tip between spring leaves. The perforations in the insert are packed with a heavy lubricant. Springs equipped with DANN Insert have in their construction practically 10,000 oil pockets.

WRITE FOR SAMPLE OF INSERT AND FULL DESCRIPTIVE LITERATURE. DEALERS WANTED EVERYWHERE.



X-Ray view of spring equipped with Dann Insert, showing how the oil-packed strips of Insert are placed between spring leaves.

FORD MOTORISTS! The Schaefer Sales Corporation, 1501 Arcadia Building, Detroit, Mich., is prepared to supply the trade and Ford owners with Dann Ford Insert—cut to proper lengths, neatly packed in a box, and ready for immediate installation between the spring leaves of any Ford car. Complete instructions accompany each order, making it an easy matter for you or your garageman to "Oil Cushionize" your Ford springs with the utmost despatch.

Put Dann Insert on Your Old Car--Demand It on Your New Car

on **Spring Insert Company**
Chicago, Illinois

THOUSAND OIL POCKETS

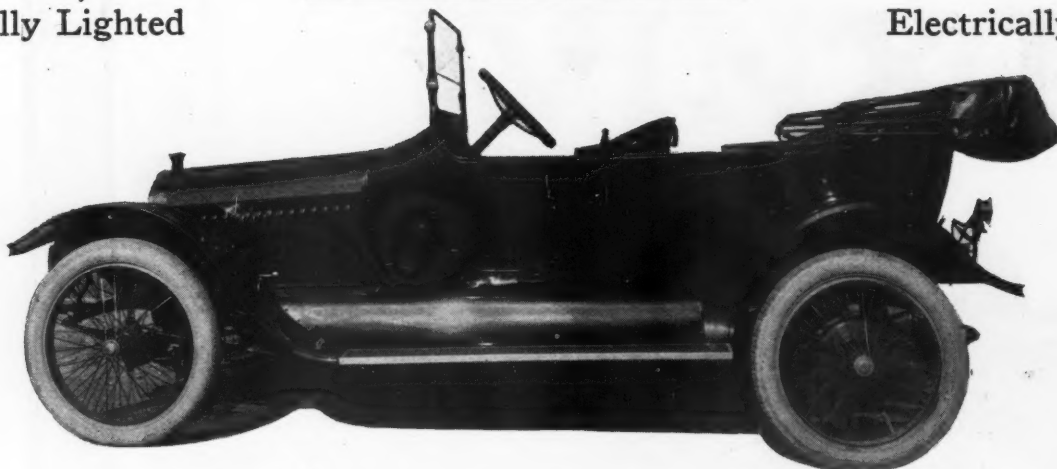
1915 ANNOUNCEMENT

Monarch

MOTOR CARS

Electrically Lighted

Electrically Started



A STANDARDIZED CAR

FOURS
\$1000

SIXES
\$1400

F. O. B. Detroit

110-in. Wheelbase

Continental 3 1/2 in. x 5 in. Motors

Salisbury Axles

Auto-Lite Starting, Lighting and Ignition

118-in. Wheelbase

Detroit Gear Transmissions and Controls

Hartford Cone Clutch

Mott Wire Wheels

We are pleased to announce that we have now completed our first run of MONARCH cars and they have met with most emphatic approval wherever shown.

In order to meet the great demand that is being made upon us, we have provided for the production of

FIVE THOUSAND CARS

for the season of 1915. To facilitate this production plans are now being made for a new factory to be ready about January 1st, next.

DISTRIBUTORS

We have a few choice territories yet open and a most attractive proposition for the right representatives.

Do not overlook this opportunity of securing YOUR territory for one of the liveliest and most profitable selling propositions in the history of the automobile.

REMEMBER, we are now shipping regularly. You can get demonstrators promptly and good deliveries thereafter.

MONARCH MOTOR CAR COMPANY

R. C. HUPP, President

DETROIT, U. S. A.

When Writing to Advertisers, Please Mention Motor Age

This Stewart Speedometer

should be placed immediately on your

FORD

\$12



\$12

THIS new Stewart Speedometer designed especially for Ford cars, is priced at only \$12. It is the biggest \$12 worth of safety, economy, satisfaction and pleasure you'll ever get.

You cannot be safe from arrest for violating speed laws unless you obey the very *letter* of the law—by watching this Stewart Speedometer while you drive your "Ford."

You cannot economize on gasoline and oil unless you check the "miles per gallon"—by watching this Stewart Speedometer while you drive your "Ford."

You cannot prove to the tire dealer that your tires gave out before running the number of miles guaranteed—unless you can show him the actual figures as registered by this Stewart Speedometer.

You cannot confidently and surely follow road maps without pacing off the miles with this Stewart Speedometer.

You cannot get half the full pleasure out of your "Ford" unless you have this Stewart Speed-

ometer to tell you how many miles you've driven and what speed you can make, both on the level and on hills.

Don't wait a single day. Don't drive your "Ford" a single mile without this "Stewart." It is a beautifully made and finished instrument, with regular 60 mile, rotating speed dial—10,000 mile season odometer—100 mile trip odometer, with re-set device—jeweled bearings—silver etched dial face—French plate dial glass—case in deep jet lacquer with polished brass trim to match your Ford car.

This Stewart Speedometer is backed by the world-famous "Stewart-Warner Service"—the most highly organized, efficient and universal service in existence.

If you can't get this Stewart-Speedometer from your Ford dealer, then get it from any jobber, supply dealer, garage man, or direct from any of our branches or service stations. *Installation free at any of our branches.*

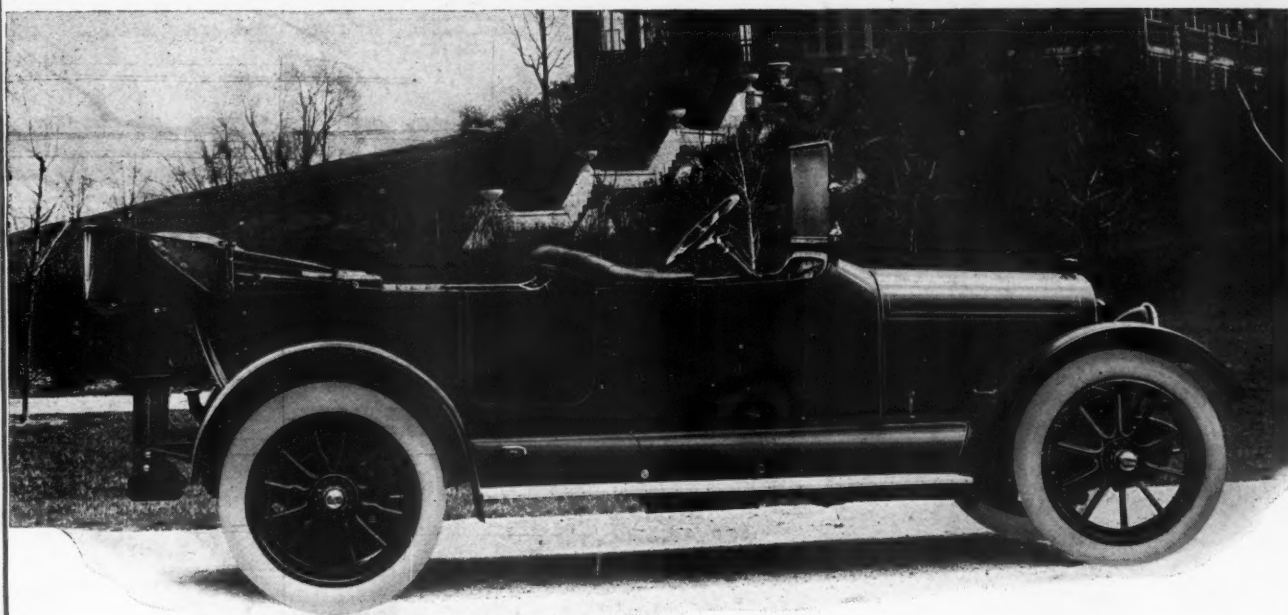
The minute you buy your "Ford," have this "Stewart" attached.

Stewart-Warner Speedometer Corporation

Executive Offices: 1931 Diversey Boulevard, Chicago

Factories: Chicago and Beloit, Wisc.

17 Branches. Service Stations in all cities and large towns



Announcing the 1915 Series Premier 6-49 \$2385

The Premier 6-49 is a car of distinction and quality. The electric lights, starter, left side drive, one-man top, deep, soft upholstery and comfortable riding qualities make it the buy of the season. Nothing but the best enters into the construction and equipment of Premier, and only through the fact that its popularity has permitted a low selling cost are we able to offer a Premier at \$2385, the best in every respect, at the price of a high-grade four-cylinder car.

The New Standard of High-Grade Automobile Value

*You are cordially invited to inspect our new series
while in Indianapolis attending the big race*

PREMIER MOTOR MFG. CO.
Indianapolis

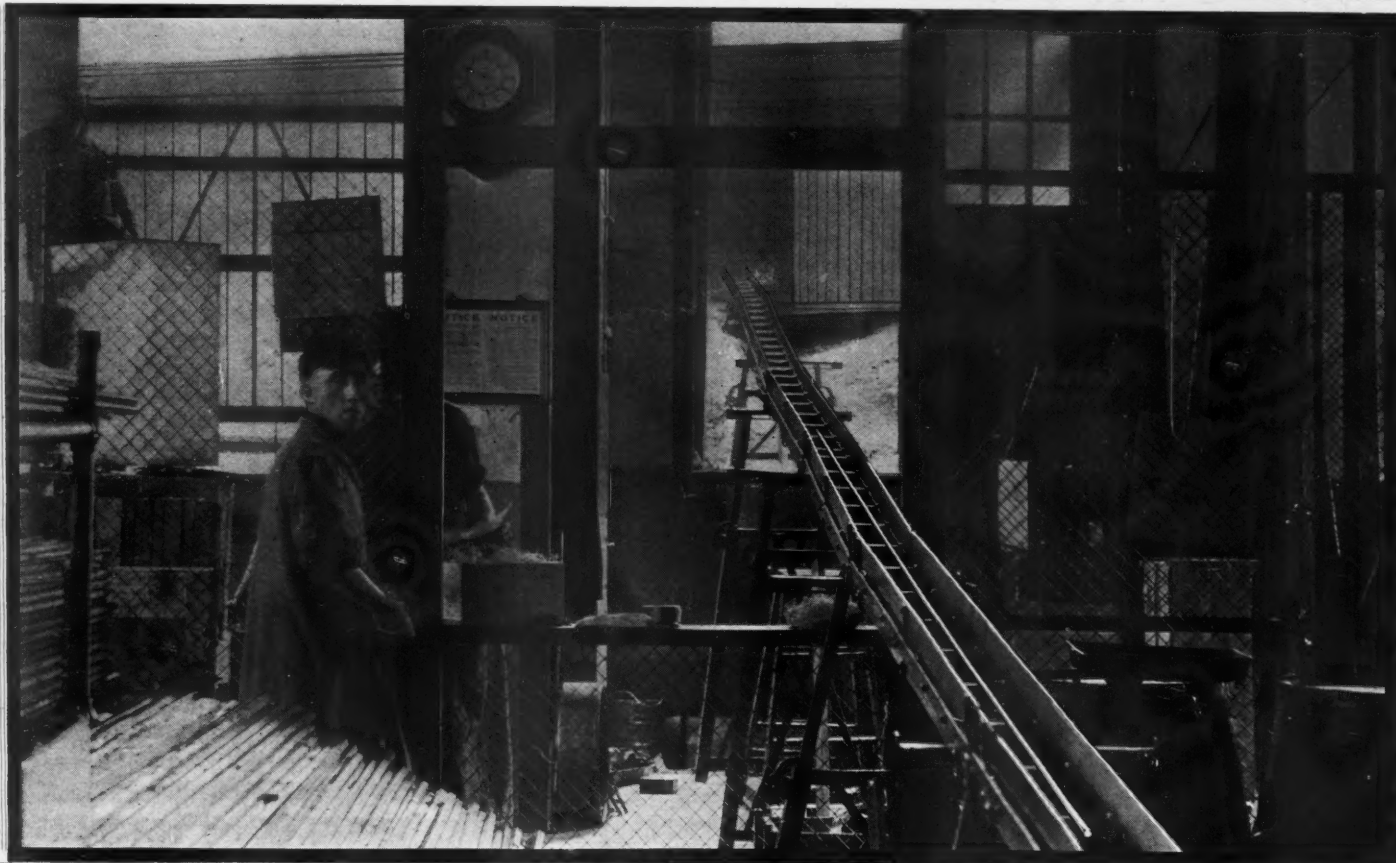


Champion of Toledo

25000
Spark Plugs
DAILY



World's Largest Spark Plug Makers



UNLOADING STEEL DIRECT FROM THE CAR

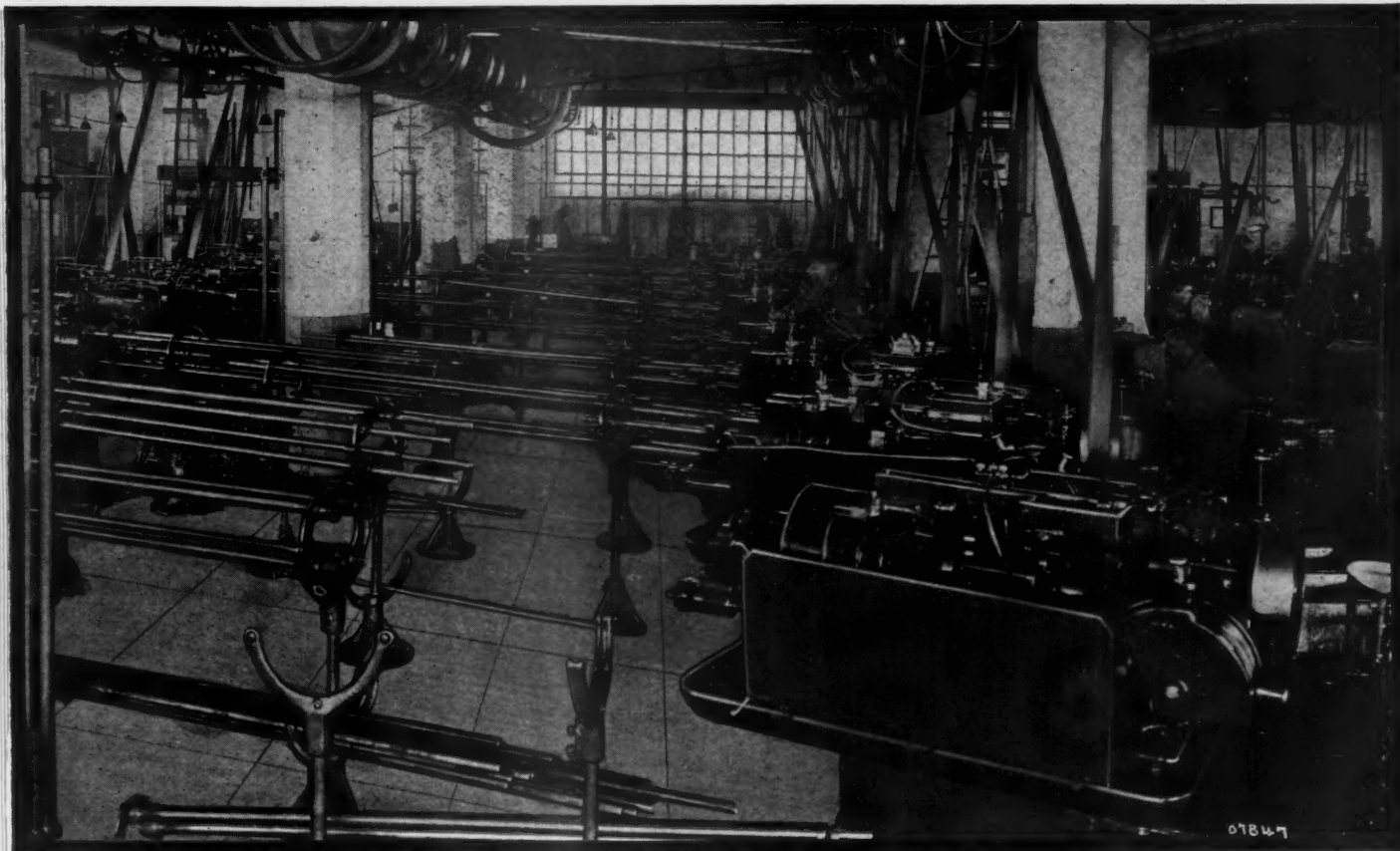


SEVEN CAR LOADS OF STEEL KEPT IN STOCK

Twenty-Five Thousand Plugs Daily



ONE BATTERY OF LARGE AUTOMATICS



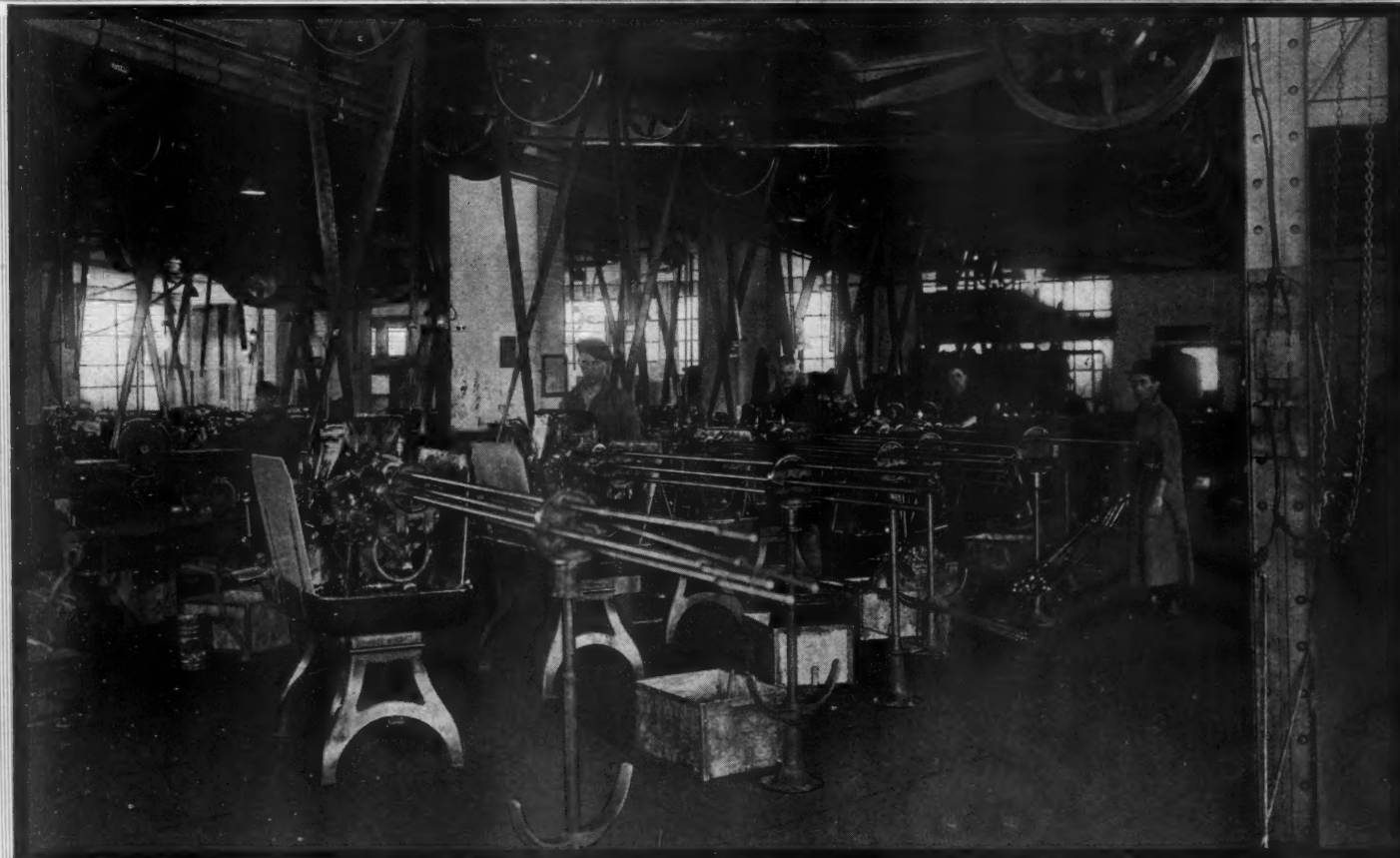
A FLOOR OF THE FINEST AUTOMATIC MACHINES THAT CAN BE BOUGHT



World's Largest Spark Plug Makers



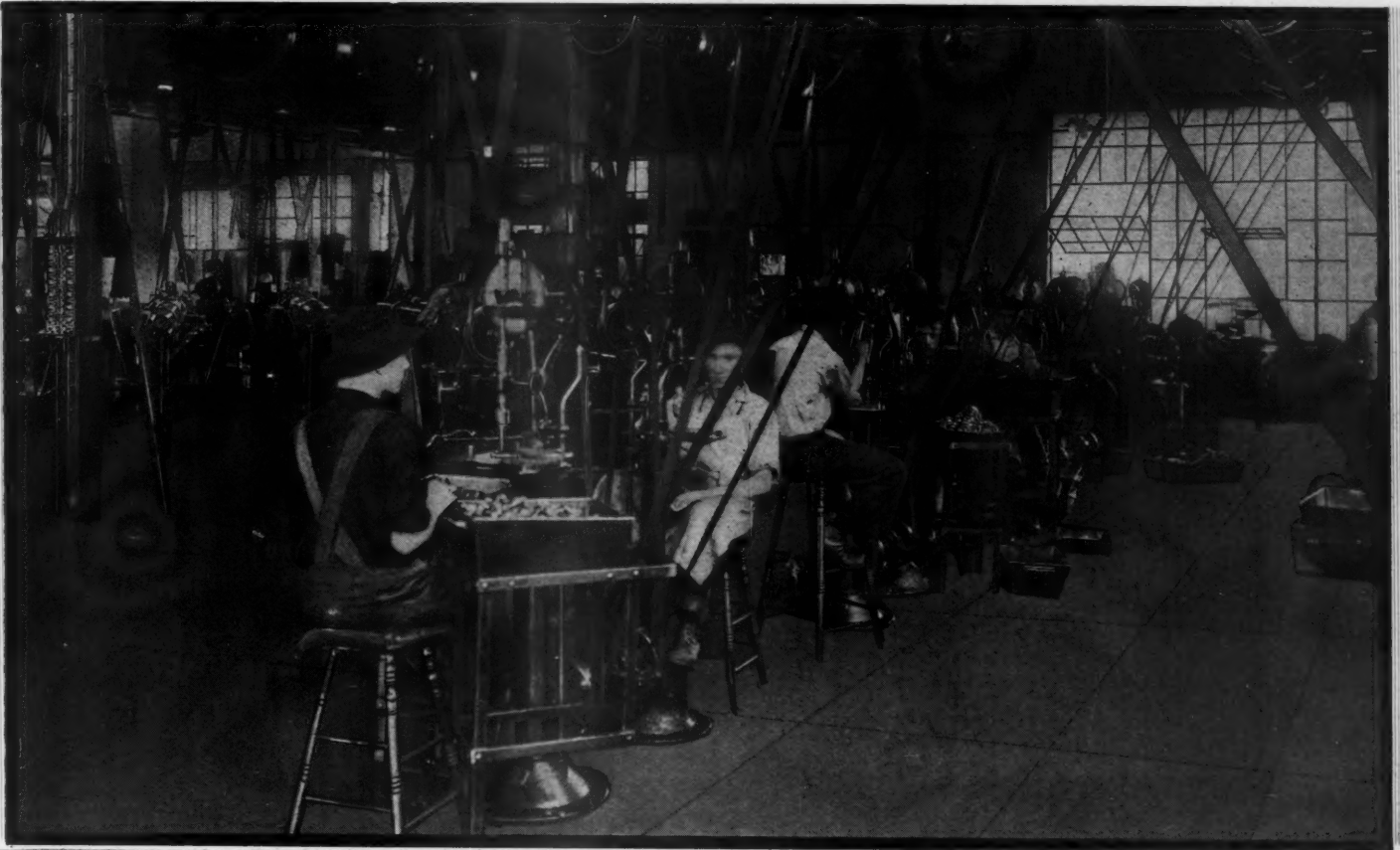
BATTERY OF AUTOMATICS FOR SPECIAL WORK



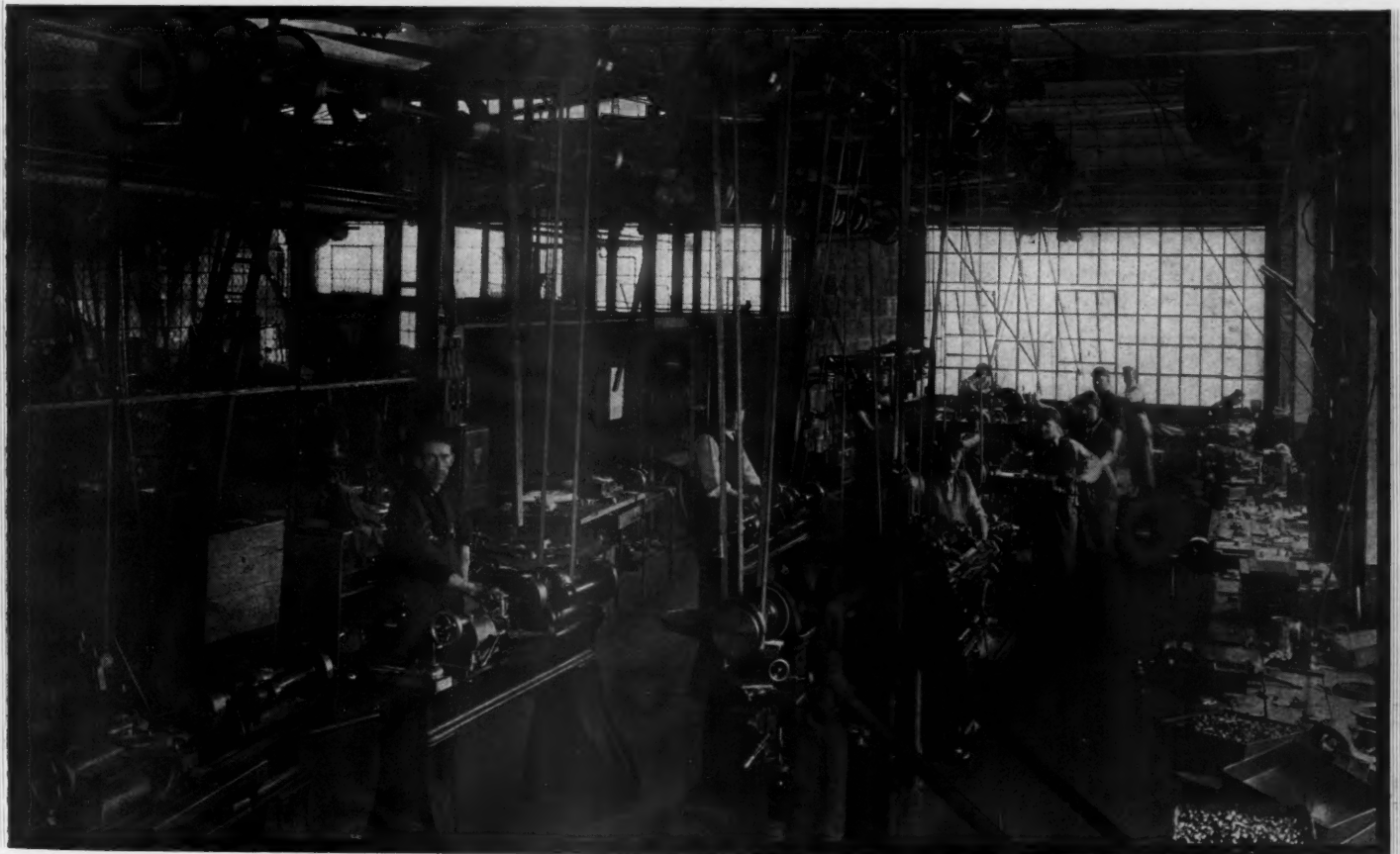
AUTOMATICS USED FOR ALL SMALL BRASS NUTS



Twenty-Five Thousand Plugs Daily



A ROW OF DRILL PRESSES FOR SMALL OPERATIONS



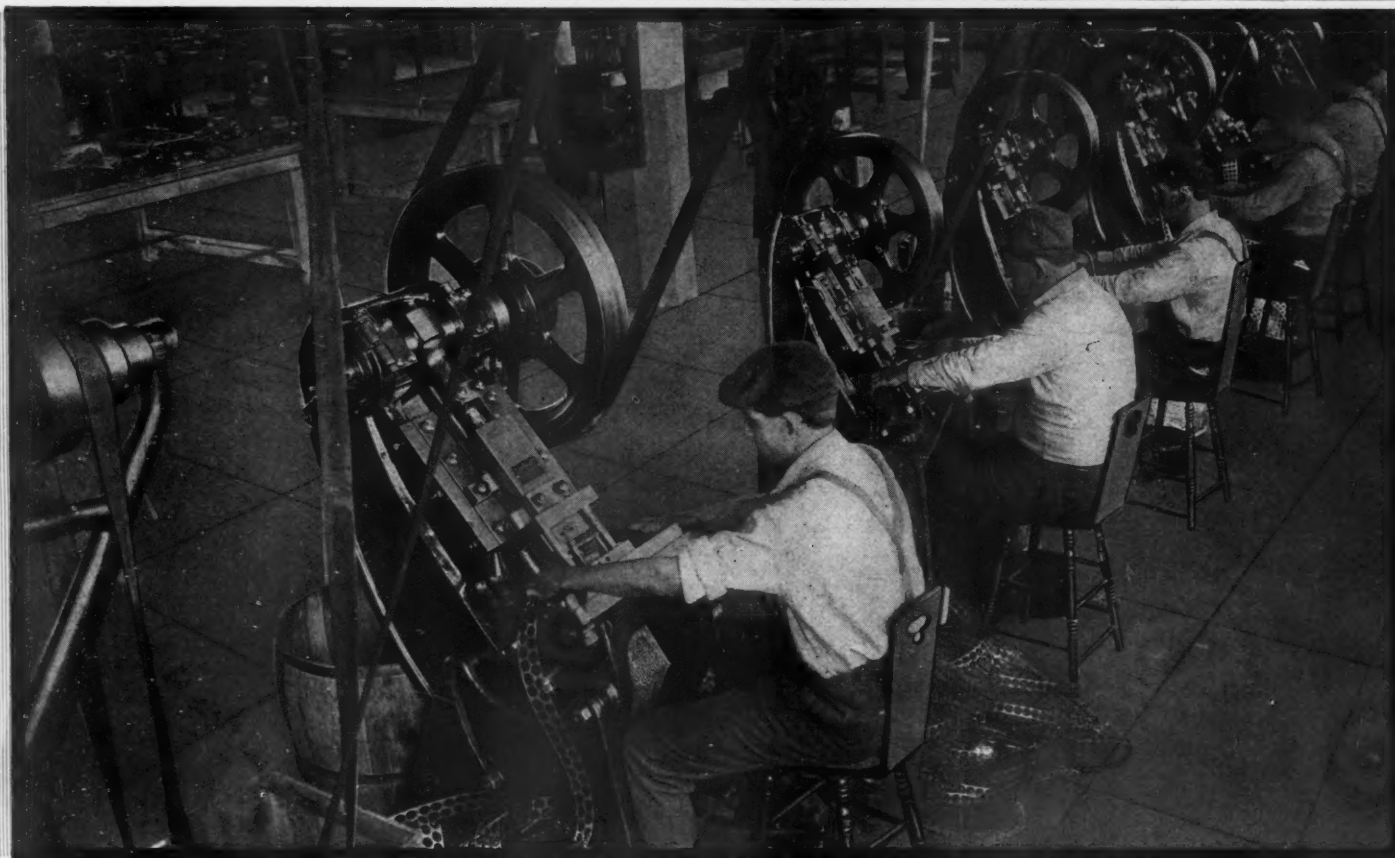
TOOL ROOM



World's Largest Spark Plug Makers



FIFTY THOUSAND SHELLS READY FOR ASSEMBLY



MAKING MILLIONS OF COPPER AND ASBESTOS GASKETS



Twenty-Five Thousand Plugs Daily



HALF A MILLION PORCELAINS ALWAYS KEPT IN STOCK



WELDING ON THE NICKEL ELECTRODES



World's Largest Spark Plug Makers

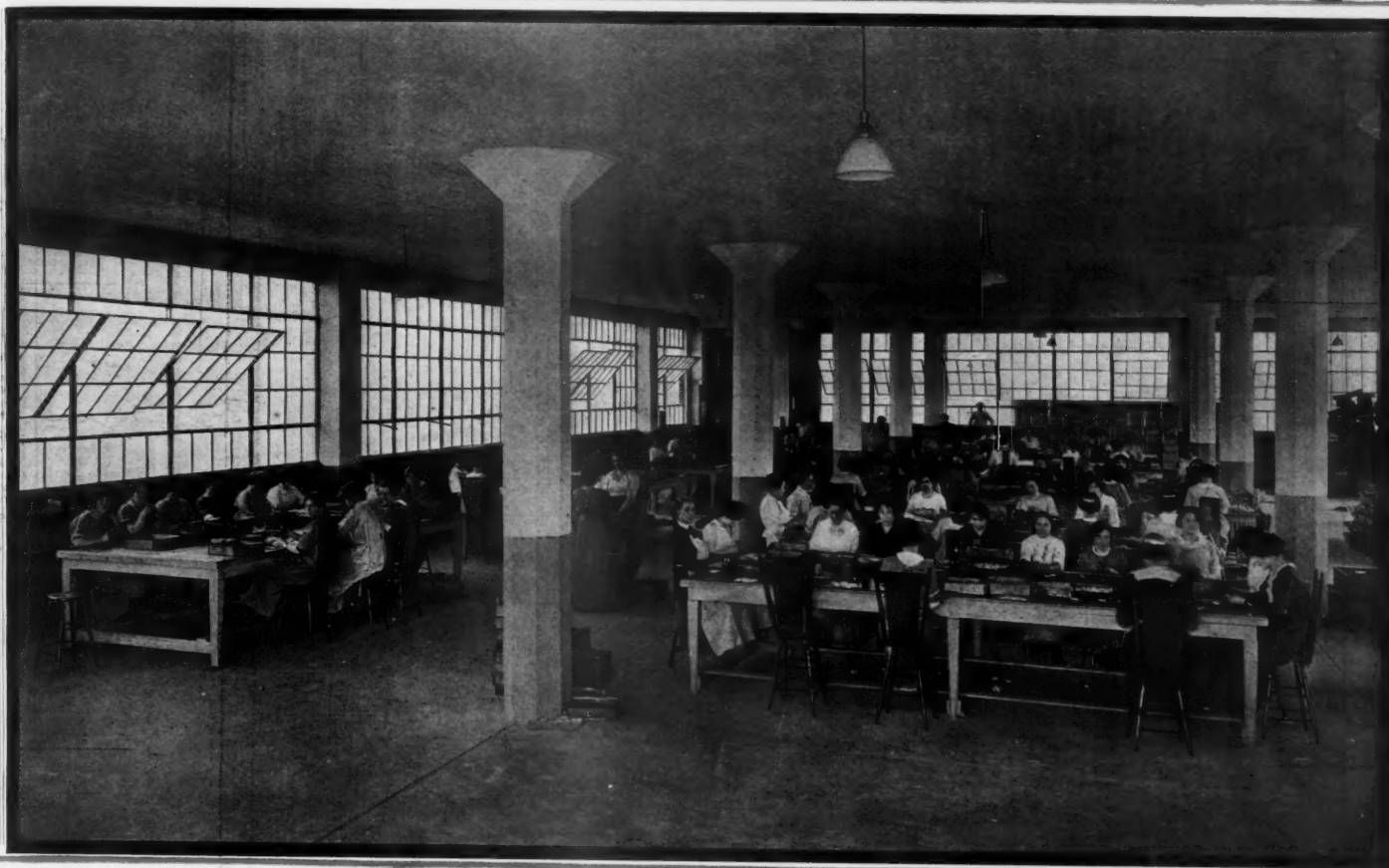


WHERE THE PLUGS ARE LOOSELY ASSEMBLED

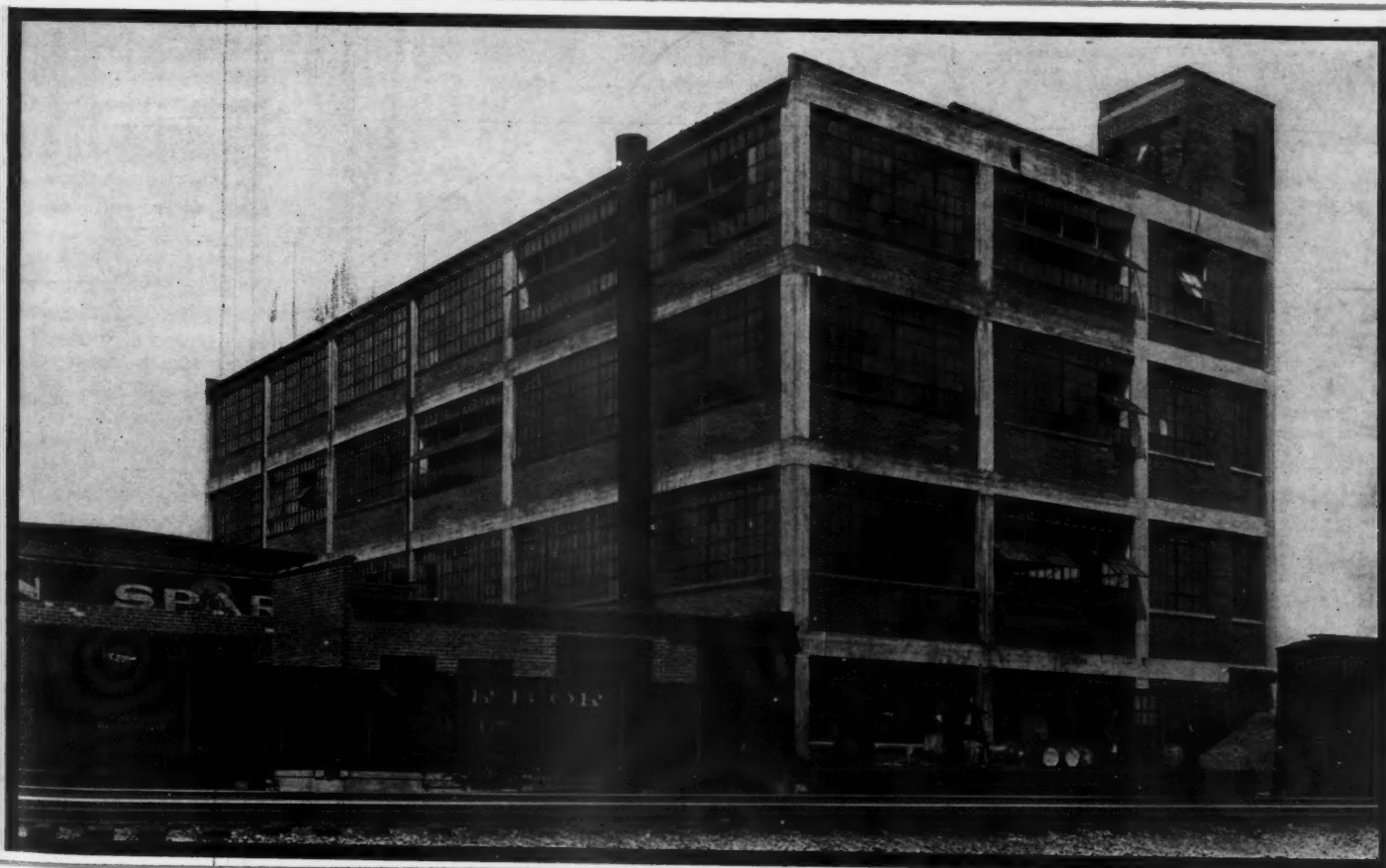


TIGHTENING UP THE ASSEMBLED SPARK PLUGS

Twenty-Five Thousand Plugs Daily



A PART OF THE GENERAL ASSEMBLY FLOOR



OUR RAILROAD FACILITIES ARE UNEQUALED



World's Largest Spark Plug Makers

UNEXCELLED FACILITIES

In this new day-light factory, we are now producing the SPARK PLUGS which equip seventy-five per cent of all the motor cars made this year. They will be found as factory equipment on FORDS, OVERLANDS, STUDEBAKERS, MAXWELLS, METZ, and forty-eight other well-known makes of motor cars.



Twenty-Five Thousand Plugs Daily



THE ORGANIZATION BEHIND CHAMPION SPARK PLUGS

Here are some of the men who have made CHAMPION SPARK PLUGS famous. This is the home organization, consisting of administration officers, traveling representatives, and the factory superintendents. Such an organization of the best trained men obtainable anywhere is not unknown in the complete car field but in the accessory field — just ask any manufacturer.





World's Largest Spark Plug Makers



THIS IS THE
REGULAR
PACKAGE

We make plugs for absolutely every type of motor, designed by our engineering department, with characteristics which especially adapt them to the particular motor for which they are made.

OUR GUARANTEE

We absolutely guarantee CHAMPION SPARK PLUGS against every defect, even against heat-breakage-of-porcelain. We replace without question, any plug that does not give entire satisfaction, and we leave it to your judgment.



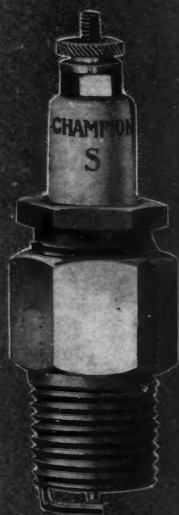
THIS IS THE
FORD
PACKAGE



3/8 in.
CHAMPION
REGULAR
(MAZDA)
\$1.00



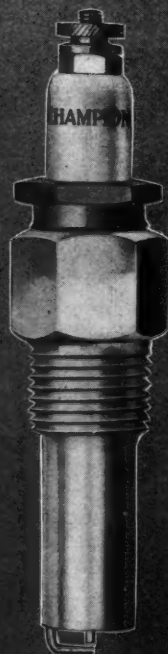
1/2 in.
CHAMPION "X"
(FORD)
75 cts



3/8 in.
CHAMPION "S"
(STUDEBAKER)
\$1.00



3/8 in.
CHAMPION TRUCK
\$1.00



EXTRA LONG
CHAMPION REGULAR
(MEXICO)
\$1.00



LONG 1 1/8 in.
CHAMPION REGULAR
(TRUCK)
\$1.00



3/8 in.
CHAMPION
HEAVY TRUCK
\$1.00

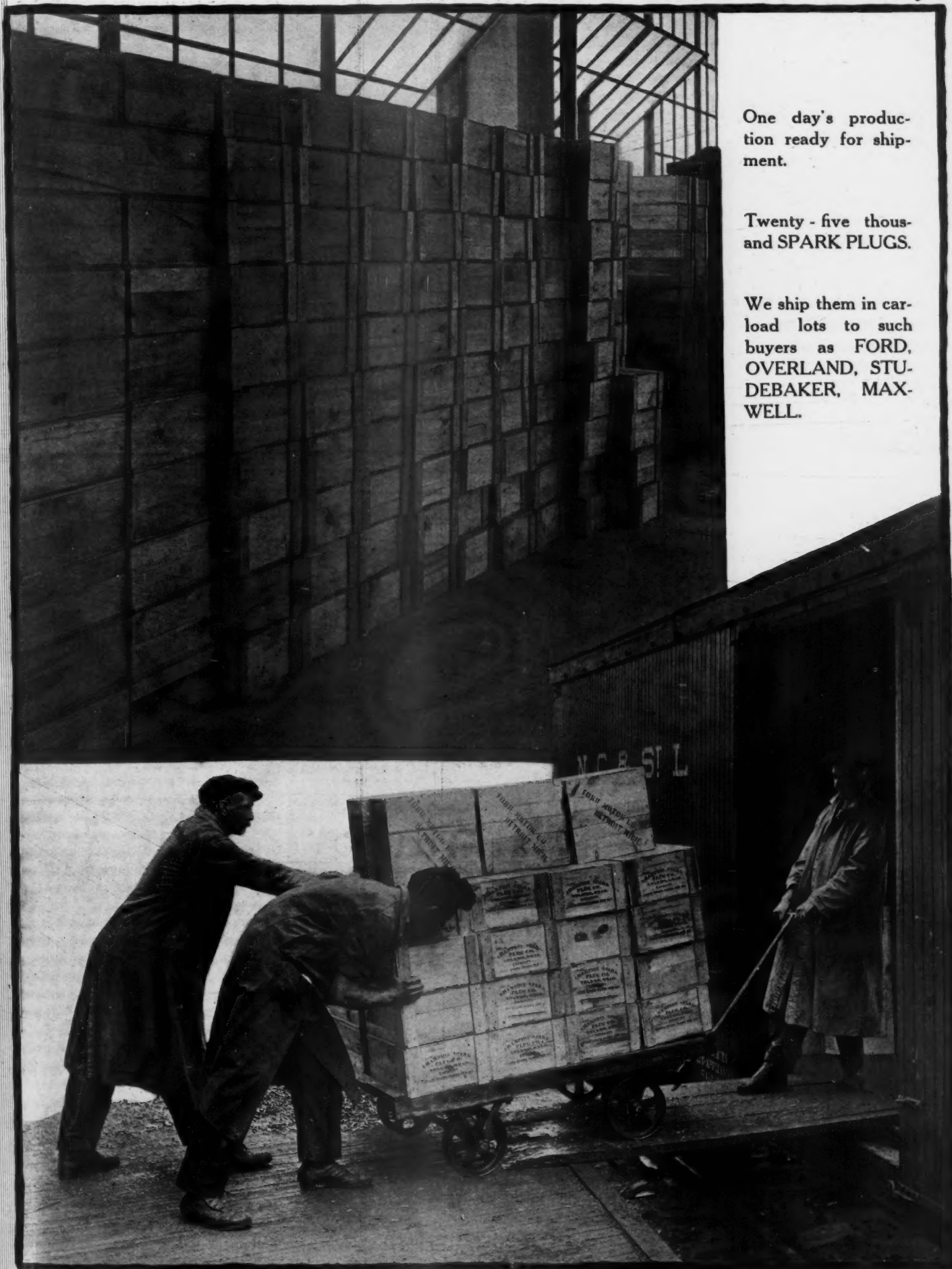
Twenty-Five Thousand Plugs Daily



One day's production ready for shipment.

Twenty-five thousand SPARK PLUGS.

We ship them in car-load lots to such buyers as FORD, OVERLAND, STUDEBAKER, MAXWELL.





World's Largest Spark Plug Makers

UNSURPASSED

35,000 Distributors

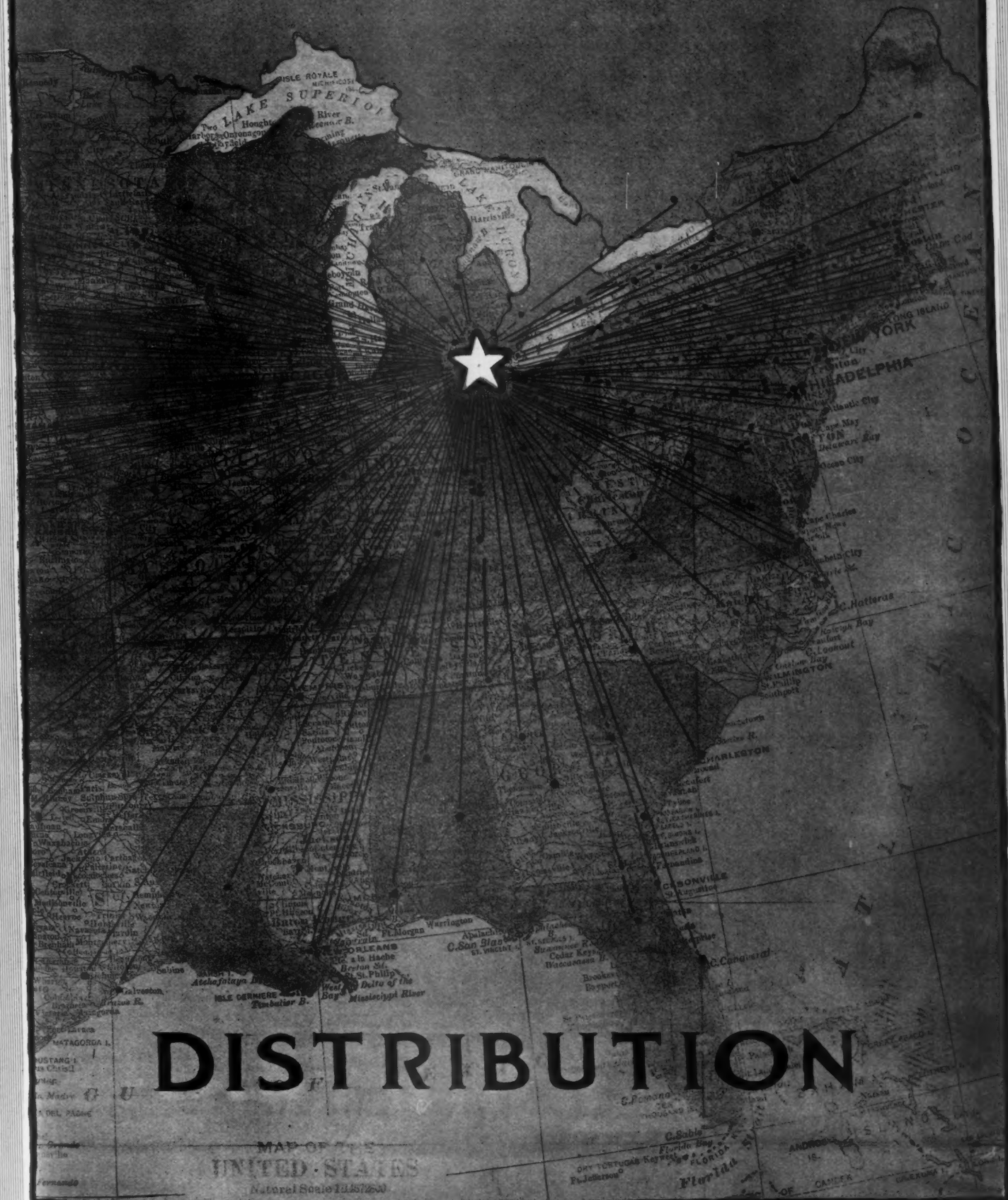
Here you see located on the familiar map the principal distributing centres for CHAMPION SPARK PLUGS. Of course we could not mark every distributor, since there are thirty-five thousand of them.

In the whole field of Automobile Accessories, there is no distribution more complete, more universal, or more satisfactory to distributor and consumer than that of CHAMPION SPARK PLUGS.

Twenty-Five Thousand Plugs Daily



NATIONAL





World's Largest Spark Plug Makers

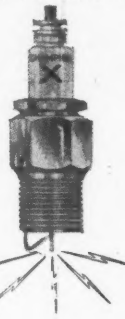
R.A. STRANAHAN, PRESIDENT



CHAMPION SPARK PLUG CO.

SOLE MANUFACTURERS OF
Champion Spark Plugs
TOLEDO, OHIO, U.S.A.

F.D. STRANAHAN, TREASURER



Mr. Reader,
Everywhere.

Toledo, Ohio
May 19th, 1914

Dear Sir:-

Summing up, we wish to brand your mind with the following impressions about Champion (of Toledo) Spark Plugs and our organization:

1. We have manufactured Spark Plugs for the past six years.
2. During that time we have become Spark Plug specialists and manufacture nothing else.
3. The enormous growth and demand for Champion Spark Plugs is based entirely on the merit of our product.
4. In the manufacture of Champion Spark Plugs the highest grade materials best adapted for the purpose are used. Our methods and workmanship are unsurpassed.
5. Our plant is equipped with special automatic machinery which enables us to produce in large quantity, at the same time insuring accuracy.
6. Quantity production insures a higher relative quality at a reasonable price and guarantees prompt deliveries.
7. The foundation of our success is based on quality goods to the consumer, fair treatment to the dealer and prompt service and shipments to the manufacturers.
8. We absolutely guarantee every Champion Spark Plug against every defect, even against heat breakage of porcelain. We replace without question any plug that does not give entire satisfaction, and you are the judge.

Yours truly,

CHAMPION SPARK PLUG COMPANY

Robert A. Stranahan
President.

Stop! Read! Heed!

Partin-Palmer "38"

\$975

FULLY EQUIPPED



SIX PASSENGER—38 H. P.—115 INCH WHEELBASE

Electric Starter and Lighting System If Desired

Live Dealers Quick Don't Be Too Late

Watch the high-priced cars struggling to come down to our price—but don't lose money *waiting* for them.

The motor car buyer has awakened to the fact that he has been paying too much. He has demanded three things—a big, roomy, comfortable, six-passenger car—not less than 38 H.P.—at a price less than \$1000—and here it is—the Partin-Palmer "38"—ready to deliver to you *immediately*—ready for you to sell at a *profit*—a live car for live dealers.

From Maine to California—in every quarter of the globe—you will find satisfied and delighted owners of this Partin-Palmer "38."

Some one in your territory is going to make big money this season selling the Partin-Palmer "38."

Are you the Man?

Just say you are interested and we will place in your hands by return mail full and complete description of this wonderful seller—and satisfy you as to our financial responsibility and ability to make deliveries.

This is the season for the popular priced car—with the Partin-Palmer "38" on your sales floor you can laugh at competition.

Write, wire, phone or call—act AT ONCE.

LARGEST—MOST POWERFUL MOTOR CAR EVER SOLD AT \$975

PARTIN MFG. CO., Suite 547, 29 S. La Salle St., Chicago, U. S. A.



CONTEMPORANEOUS with the appearance of this advertisement, we are beginning a concrete, national campaign of education that is going to put before the trade and its customers the real extent and value of Sheldon Service as they have never understood it before.

Demand for reliable trucks is opening new fields for dealers daily, and you who read this advertisement are either selling them now or will doubtless sooner or later be selling commercial cars.

Our object in advertising to the public is to reach a large percentage of truck owners who ought to and who will know more about axles, springs and brakes—this, through SHELTON advertising.

We are advertising specifically SHELTON Worm Gear Rear Axles—a very radical development in the methods of truck power

SHELDON

transmission, also SHELTON Springs, Front Axles, brake and radius rod equipments.

This campaign is yours as well as ours. We want it to interest you. We want you to have full knowledge of the great advantages in service and satisfaction the truck owner will have for his equipment, embracing these four important parts.

We want your co-operation in the matter of studying this advertising. You may not need the information just yet, but sooner or later, you will be called upon to assist the buyer in the important matter of specifications.

As a matter of first interest, you will do well

to write us. We have interesting facts at your disposal.

The Worm Drive

The Sheldon worm drive has simplified truck power transmission to its finality. The shaft from the transmission carries the worm which directly engages the worm wheel on the semi-floating rear axle, thus providing a positively direct drive. It is self-lubricating and increases in efficiency as it wears.

The Sheldon Worm-Drive Axle is recognized throughout the entire automobile industry as a superior product, sold at a superior price, to those who are willing to pay for what is absolutely best.

115R

Sheldon Springs

Sheldon springs represent the highest development in the art of spring making. They cost more to produce and sell for more. The steel used is built over a formula that insures minimum fatigue—minimum breakage. Correct design and assemblage makes each spring

absolutely true in resiliency to its companion spring. Sheldon springs absolutely compensate in resiliency and show practically no difference in weight in companion springs leaving our testing department.

SERVICE

Front Axles

Sheldon front axles embody many different and better points of construction and design. They are built in a factory where precision and severe chemical and physical tests prevail. They are guaranteed to withstand the most violent abuse under road, load and lateral shock. We have been building axles for 50 years and know how.

Sheldon Axle Co.

Wilkes Barre, Penna.

Chicago
Peoples Gas Bldg.
122 S. Michigan Blvd.

San Francisco
444 Market St.

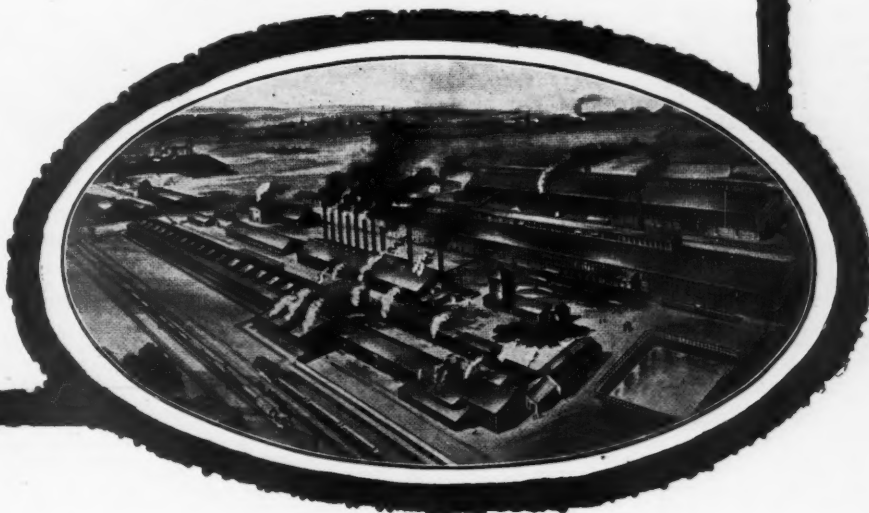
Detroit
1215 Woodward Ave.

Makers of springs and axles for heavy duty service for more than fifty years.

Brake and Radius Rod Equipments

Sheldon brake and radius rod equipments have stood the test of severe service. They can be supplied in sizes for all types of service.

Locating both brakes on the rear wheels does away with roundabout methods of braking application. Both pedal and lever connect directly with the brake bands. We do not utilize the jack shaft, propeller shaft and bevel gears as methods for transmitting braking power to the rear wheels.



The "Inside" Story of the Most Notable Car of the Year



Model 42
Five-Passenger

THOUSANDS of eager motor enthusiasts have been waiting for the real facts about this new "Light Four." Here for the first time the full details are made public, showing Oldsmobile quality manifest in every particular. To build such a car and sell it for but \$1350 is a remarkable achievement, as yet unparalleled by any maker of strictly high-grade cars.

For months back the news has been passed around that a new Oldsmobile was on the way—a "Light Four" worthy of its famous name in every respect. When it became known that the new Oldsmobile would be sold at a "popular price," dealers and prospective buyers of cars were on tiptoe with eagerness to get the complete details of this new light car de luxe.

A True Replica of the Oldsmobile "Six"

Picture to yourself an exact reproduction of the famous six-cylinder Oldsmobile, reduced in wheel base length to 110 inches. The proportions are perfect. One dealer said, "It is just like looking at the 'greatest six-cylinder car in America' through a reducing glass."

The same distinctive Oldsmobile lines that show the refinement of the highest-priced cars of foreign design. The same low center of gravity, that makes it seem to "hug the ground," yet affording ample clearance. The same indefinable evenness of proportion and grace of line from radiator to rear axle.

Everywhere Oldsmobile Completeness Is Apparent

Now examine it closely for those distinctive elements of design, finish and equipment that have always been the hallmark of Oldsmobile quality.

Wide 22-inch doors, front and rear, make it convenient for entrance and exit, for even the largest person. It is not necessary to edge in. Inside the car, both front and rear, you will find the same generous provision for your comfort. In the rear, a seating width of 45 inches insures ample room for three passengers to sit in comfort. From the edge of rear cushions, there is a clear space of 29 inches for leg room—ample, you will admit, for the tallest man. In front, the same idea is worked out; 39 inches seat width,

and 20½ inches from cushion edge to clutch pedal gives the driver and his companion a sense of freedom and space that makes driving a real pleasure. This comfort in a car of moderate wheel base is unusual—you have, of course, noticed that before—and has been obtained in this light Oldsmobile because of the compactness of our motor, which allows a moderately short hood, and a maximum of body room.

Like Cars Twice Its Cost It Starts and Lights by Electricity

You have learned to expect the Delco equipment for starting, lighting and ignition only in cars of the highest class, most of them selling for \$2000 and upwards. Yet we have included this system, which is universally recognized as the highest type of electrical starting and lighting apparatus in existence, as part of the regular equipment of this new model, at no extra cost.

On the beautiful Circassian walnut dash, right in front of the driver, a touch of the button starts the low, even "purr" of the motor. Another switch turns on the lights, electric bulbs, side, front and rear, and an adjustable focusing device enables you to get the full strength of your electric headlights, without stirring from the seat.

Olds

On the dash, also, a beautiful unit, with every instrument set flush, is a complete equipment such as you ordinarily find only in cars of superlative design and price—Speedometer, eight-day clock, as well as full control of starting, lighting, etc.

At night, every portion of the dash is flooded with electric light, giving the same perfect control as by daylight.

Keeping Up the Standard of Oldsmobile Quality

In the Oldsmobile that sells for over \$3000, you see cast aluminum foot board and running boards. You find the same features in this new "light four." The gasoline tank in the Oldsmobile Six is fastened to the main frame in the rear; you will find the same arrangement in the new light car; woodwork throughout both cars is finest Circassian Walnut.

The overhead valve construction gives, as any engineer will tell you, the maximum of power. This unit power plant, with all valves enclosed, with specially designed Oldsmobile aluminum silencer, is, we sincerely believe, the most efficient, smoothest-running motor of the overhead type on the American market. Its four cylinders are cast en bloc, with all working parts covered. The cylinder measurement is $3\frac{1}{2} \times 5$, and exhaustive road tests show great flexibility with a speed range of from 5 to 50 miles an hour. Under

What the Dealers Think of It

Who is the dealer who does not see in this new Oldsmobile Model 42 an unusual opportunity? Many dealers who had practically completed their plans for the coming season have changed their entire selling arrangements so as to include this new Oldsmobile. Some have even taken it in self-defense, as they do not care to have it in some competitor's hands to their own ultimate harm.

We will make thousands of this new "four" where we make hundreds of our larger car. Therefore, our selling field is so greatly enlarged that we are able to consider applications from many new dealers where we are not represented.

To the dealer who sees here a rich opportunity we extend our invitation to write us for terms and territory, and ask in return that he will give us fullest information as to his ability to properly represent us. Here, if ever, is an opportunity for a profitable season's business, for the advance demand shows that this is the car for which the public is eagerly waiting. Don't delay—write or wire at once. Some dealers are using the long distance telephone.

"The Greatest Six Cylinder Car in America"

We shall continue to manufacture, in increasing quantities, the six-cylinder Oldsmobile that has earned this proud title.

Its price—\$2975 for the five-passenger model, \$3150 for the seven-passenger size—is no measure of its standing, for it is comparable only to those American-Built cars selling at the very top-most figure. It marks the limit of six-cylinder values.

We have a very beautiful and complete catalog describing the Oldsmobile Six that will be sent on request.

Olds Motor Works Lansing, Michigan

Please send me complete information about the new Oldsmobile "Four."

Name

Street

Town..... State.....

I am ☐ interested in your proposition to dealers.

M. A.

mobile

\$1350

Concealed tool box, just the same as in the \$3150 Oldsmobile Six, equipped with standard tool kit, tire pump, and jack, all of exceptional quality. In many other details, this new Oldsmobile is far ahead of other cars of its price class. Where else would you find a car at \$1350 with hickory wheels, especially the artillery type, with twelve spokes in both front and rear wheels? The rear spokes are embossed, and all have a natural wood finish.

Jiffy curtains are a regular part of our equipment, as well as cape top, with boot, just like the kind you see on cars demanding much higher prices.

These details mark the completeness you expect with the Oldsmobile, but which no maker has heretofore had the courage, the knowledge, or the facilities to build into a car at this astonishingly low price.

Strength Without Excess Weight

We emphasize this remarkable car as a "light" four. It has sturdiness, staunchness, strength in every line, but not an ounce of excess weight. Run it on the scale, and it shows less than 2500 pounds, shipping weight. Only an organization of master car builders working with the knowledge and experience that comes with years of building only to a quality standard could hope to reach this result.

This Motor Will Compel Your Admiration

Lift the hood. There nestles a compact, silent, smooth-running unit power plant that arouses your admiration even by its neat, efficient appearance. Take your seat at the wheel, and by a push of the button bring it to the proof of actual performance. It will compel your enthusiastic praise.

For it has the power, the silence, the smoothness that characterizes the high grade product of an organization that does not know how to cheapen or slight its output.

ordinary road conditions it will make 16 to 18 miles per gallon of gasoline, and by careful handling it has done much better than this. The engine is mounted on the main frame, with three-point suspension that eliminates all vibration.

A Car Worthy of Its Famous Name

Can you help feeling, with us, that this new Oldsmobile represents the very pinnacle of light car perfection?

If at any point we felt it necessary to add to its quality to make it more worthy of its famous name, we would do so, even if it compelled us to add hundreds of dollars to its cost.

But, through long experience, careful planning, perfect factory organization, and quantity production, we are able to offer you this car—the kind you have always hoped some manufacturer would make some day—for only \$1350.



Model 54
Six-Cylinder, Seven-Passenger **\$3150**

Hupmobile

The car of The American Family



\$1050 Completely Equipped

With Electric Starter and Lights, Over-size Tires, Demountable Rims, \$1200

Next Spring—Not This!

How will you feel *next* Spring about the car you buy *this* Spring?

That's the one, the all-important question.

Will it wear as a Hupmobile wears, and run as a Hupmobile runs, after twelve months of persistent pounding?

Will the motor be the same sweet-running, mellow motor the Hup long-stroke motor is in its second, its third, and its fourth season?

We ask for the purpose of pointing out the marked characteristic that makes people buy Hup after Hup—or use the same Hup, season after season.

Service—Low Cost Service

That characteristic is long-continued, apparently everlasting service—and the consistent low cost of that service.

That's the service from which Hupmobile reputation springs; the service that has made the Hupmobile "The Car of the American Family."

That's why Hup owners are our most successful salesmen.

And isn't that quality what you must consider, first and last, in any car?

How will a lower price compensate you, a year from now, for a worn, shabby down-at-the-heel car, which you are compelled to sell for a song?

How will a neat, natty exterior this Spring compensate you for a broken-down interior next Spring?

Continuous service at a lower cost and a higher price when you want to sell at second hand—that's what makes Hup owners loyal to the car.

Think this Spring of next Spring, think of the one hundred thousandth mile and not the ten thousandth—and your investigation will surely bring you to the choice of the Hupmobile.

Hupp Motor Car Company, 1228 Milwaukee Ave., Detroit

When Writing to Advertisers, Please Mention Motor Age.

KING

**Sturdy as a Steam-shovel
—Graceful as a Swan**

KING owners experience no misgivings at entering rough country. Hills, declines, mires, sands, ruts, and rocky ways have all been amply considered by the KING'S builders. The KING meets and conquers them with a vigor and ease that assure a safe and timely return to Macadam.

The KING'S heavy cantilever springs make shock absorbers unnecessary and lighten wear on car and tires. The KING was *first* in America with this suspension—others are now following—

"The Car of No Regrets"

\$1095 WITH EQUIPMENT—Famous Ward Leonard Starting and Lighting System, \$100 net additional. Prices F. O. B. Detroit

Cantilever Rear Springs; Long Stroke Motor; 30-35 Horse Power; Unit Power Plant; Three-Point Suspension; Center Control; Gemmer Steering Gear; Complete Electric Lighting; Left Hand Steer; Full Floating Rear Axle; Hyatt Roller Bearings; Stromberg Carburetor; 18-inch Steering Wheel; Rain-vision Wind Shield; Silk Mohair Top; Electric Horn; 112-inch Wheel Base; 20-inch Rear Doors; Complete Equipment.

DEALERS, INVESTIGATE!

We may have a proposition for your district

KING MOTOR CAR COMPANY, DETROIT, MICH.

New York Agency and Showroom, Broadway at 52d St.
New York Service Department, 244-252 West 54th St.





\$250⁰⁰

FOR MECHANICAL

The Thomas B. Jeffery Company is daily receiving comments from every section of the country upon the coming dominance of the high speed, high efficiency, light weight type motor which this season has made the Jeffery Four so pronounced a success.

The many comments in the trade papers upon the constantly growing demand for economy, light weight and quality in a medium priced car, have suggested a means whereby mechanical and technical men throughout the country can to their profit express **THEIR** ideas on this subject.

We wish to embody in our advertising the best ideas of the best mechanics in America as to why this type of motor in a car of the type of the Jeffery Four must eventually dominate the medium price field.

We, therefore, are going to give \$250 in gold to mechanics, or to other persons understanding mechanical matters, who will put into 500 words or less, the best reasons **WHY THIS TYPE OF MOTOR IN A CAR LIKE THE JEFFERY FOUR IS BEST SUITED TO THE PRESENT DAY DEMANDS OF THE AMERICAN MOTORING PUBLIC FOR ECONOMY, DURABILITY AND QUALITY.**



USE THIS —

When Writing to Advertisers, Please Mention Motor Age.



IN GOLD & TECHNICAL MEN

The prizes will be distributed according to the judges decision as follows:

1st Prize— Best Answer.....	\$100	5th Prize—5th Best Answer.....	\$20
2nd Prize—2nd Best Answer.....	50	6th Prize—6th Best Answer.....	15
3rd Prize—3rd Best Answer.....	25	7th Prize—7th Best Answer.....	10
4th Prize—4th Best Answer.....	25	8th Prize—8th Best Answer.....	5

It makes no difference what language or phraseology contestants use. **WHAT WE WANT IS THE IDEA.** You stand the same chance of winning that \$100 as any college graduate. We have our own ideas about the superiority of the Jeffery Four, but in addition we want those of the best mechanics in the country.

The conditions of the contests require that contestants give their full name and address as well as their present connection. Contest closes July 1, 1914.

The judges are all of high standing and national reputation. They are:

F. E. EDWARDS, CHAIRMAN Technical Committee Chicago Automobile Club.

F. J. WAGNER, STARTER Vanderbilt Cup Races.

C. G. SINSABAUGH, EDITOR Motor Age.

NOTE—Information regarding the details of Jeffery construction will be sent upon application.

The Thomas B. Jeffery Company
Main Office and Works, Kenosha, Wisconsin

GET THIS!



When Writing to Advertisers, Please Mention Motor Age.

Mosler Supe

for **FORD** Cars

MOSLER SUPERIOR PLUGS are guaranteed to be in strict accordance with the specifications and blue print issued by the Ford Motor Car Company.

Their design, materials and assembly were evolved according to the ideas of Ford engineers and

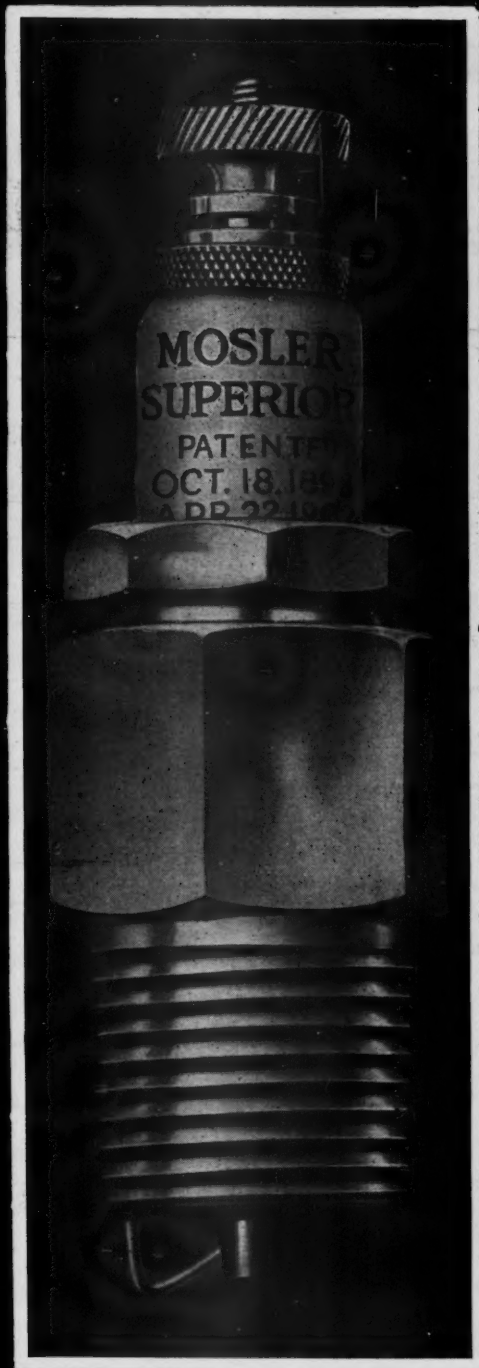
endorsed by our experts.

Every **MOSLER SUPERIOR PLUG** is not only guaranteed to be in accordance with the Ford Motor Company's plans and specifications, but the quality of its materials and the workmanship of its making are of the very highest grade.

A·R·MOSLER & CO.
NEW YORK . . . N. Y.

rior

Plug



We are the sole owners of the famous Canfield patent under which all Ford plugs are manufactured.

You are guaranteed indemnity against any and all suits for infringement by use of or sale of this plug or any part thereof.

The MOSLER SUPERIOR PLUG is the highest quality plug made especially for Ford cars.

The MOSLER SUPERIOR PLUG insures the most satisfactory results in so far as a plug can affect the ignition on Ford cars.

A Prosperous Season for Dealers Handling this Car

\$950

Fully Equipped
(F. O. B. Detroit)



This is a wonderful KRIT year—a year that has meant prosperity for KRIT dealers. They have made money during this record season—have done better than most dealers handling other cars in the KRIT price class.

Touring Car or Roadster \$950
With Electric Starter and Generator . \$1050

One reason—and a big one—why the KRIT has proved a money maker for dealers is that we did not over-contract. We sacrificed chances to add several hundred more dealers for the KRIT—because we felt obliged to take care of our present dealers with their contract requirements. This we have more than done. That, together with the wonderful value represented in the car itself, is why KRIT dealers are prosperous.

We are preparing to increase our output to take care of the greatly increased

demand for the KRIT. This, of course, will enable us to take care of a few more dealers; but our policy of **not over-contracting** will be rigidly adhered to at all times. For our own success is insufficient unless it brings continued prosperity to our dealers.

This is a particularly opportune time for dealers to become better acquainted with the KRIT. The May 30th Saturday Evening Post gives you more reasons for KRIT success. Read it.

Krit Motor Car Company, Detroit, Mich.

When Writing to Advertisers, Please Mention Motor Age.



Defies Heat!

FOR the speediest driving that's done—for the highest temperatures—for the hardest tests of the longest tours—for keenest economy always—the one complete answer is the Firestone Red Inner Tube.

All the knowing ones admit that red tubes—when they *are* right—are unbeatable. The red tube means antimony vulcanizing—the gray tube sulphur vulcanizing. The antimony treatment beats sulphur *if* handled

“just so”—otherwise you have a botch job. The Firestone experts have removed the “if” in the question of handling, and have brought the red inner tube to a new and higher standard of perfection than ever before accomplished.

Firestone

Red Inner Tubes

defy the heat of friction and scorching days. They have a density of texture, a tensile strength, a “come-back” force above comparison.

The Firestone quality and quantity of pure Para rubber, the Firestone blending and layer by layer building and multiplied inspections—these are some of the reasons back of your advantage of trouble-insurance and—

Most Miles per Dollar



DEALERS—Firestone Red Inner Tubes offer the best opportunity of the season in this field to prove the value of your service to your public. Write for particulars.

Firestone Tire and Rubber Co.
Akron, Ohio—All Large Cities

“America's Largest Exclusive Tire and Rim Makers”

Pneumatic Tires, Truck Tires, Pleasure Electric Tires, Carriage Tires, Cycle Tires, Fire Apparatus Tires, Rims, Tire Accessories, etc.

Announcing the 1915 Westcott

Mr. Dealer—Here is a Car that means Money to You and Satisfaction to Your Customers. It's the Kind of a Car the People Want—the Kind of a Car You can Sell. You can Win with the Westcott. Write for Dealer Proposition.

**"Honor Bound to
be a Good Car"**



**1915
Models
Now Ready**
Touring Car
and Roadster

**"Swift,
Silent, Sure—
Built to Endure"**

Silent Northway Motor.
Unit Power Plant.
Three Point Suspension.
Axles — Weston-Mott, front, I-beam, drop-forged; rear, three-quarter floating.
Left Drive.
Center Control.
Electric Starting.
Electric Lighting.
Demountable Rims.
Wheels — Artillery Type.
Tires—Goodrich, 33x4.
Wheel Base 113 inches.
Ventilating Wind-Shield.

Westcott Thirty Four Cylinder

Up to this Year, the Westcott Name has stood only for a Higher-Priced Car. We don't know how to make a *Cheap Car*, but Increased Production and Improved Manufacturing Methods make it possible for us to make a Car Worthy the Westcott Name to appeal to the Purse of the People. It is Light in Weight, but it has an Abundance of Strength and Speed. It has more Points of Quality and Service, and Greater Intrinsic Value than any other car of equal price on the market.

\$1285

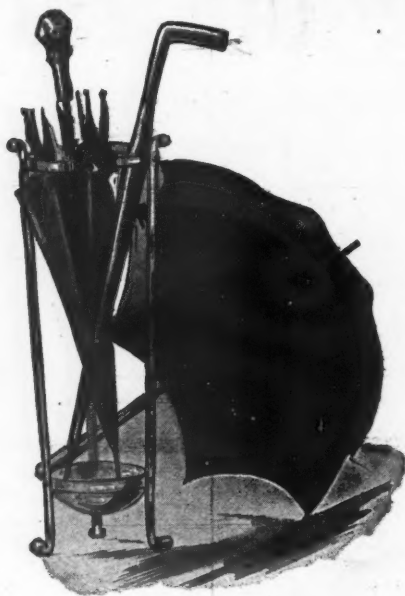
Your Car for 1915

Write for Complete Catalog and Specifications

**WESTCOTT MOTOR CAR COMPANY
RICHMOND, INDIANA**

When Writing to Advertisers, Please Mention Motor Age.

A Car of Service—
Endurance, Power,
Strength and Speed.
A Car of Economy—
Low Initial Cost
and Maintenance
Expense Reduced to
a Minimum.
A Car of Beauty—
Snap and Style in
Every Line.
A Car of Comfort and
Convenience—Easy
Riding—Easy and
Complete Control.
A Car of Phenomenal
Value at a Popular
Price.
The Kind of a Car
the People Want.



Who Ever Heard of a Rubber Umbrella?

THE functions of an umbrella and an automobile top are almost identical. The purpose of each is the same, yet there is no such thing as a rubber umbrella. Is there any **good** reason why there should be rubber in an automobile top cloth, except as mentioned in our previous announcements that such cloths have been make-shifts pending the advent of a perfect automobile top cloth.

An umbrella is made of one piece, single thickness cloth, free from all chemical compositions, yet it affords complete protection.

Laidlaw Burbank Motor Cloth is one solid piece of cloth free from rubber or artificial leather compounds. There is nothing in Bur-

bank to dry out, crack, decompose, peel, blister or rub off. These weaknesses do and always will exist in rubber interlined or artificial leather surface-coated cloths.

An umbrella is an extremely practical article which opens conveniently and folds compactly, and a good one will give excellent service for years. All because there is nothing chemical about it to be affected by heat or cold or long continued folding.

Laidlaw Burbank Motor Cloth possesses every one of the features and characteristics of a perfect top material, and retains them under the most severe and trying conditions, for a period of time longer than the life of the car.



The Laidlaw Company, Inc.

126-132 West 46th Street

New York, N. Y.

A New Era for

CENTURY ELECTRICS

**Greater Facilities—Increased Production
—The Most Efficient and Beautiful Car**

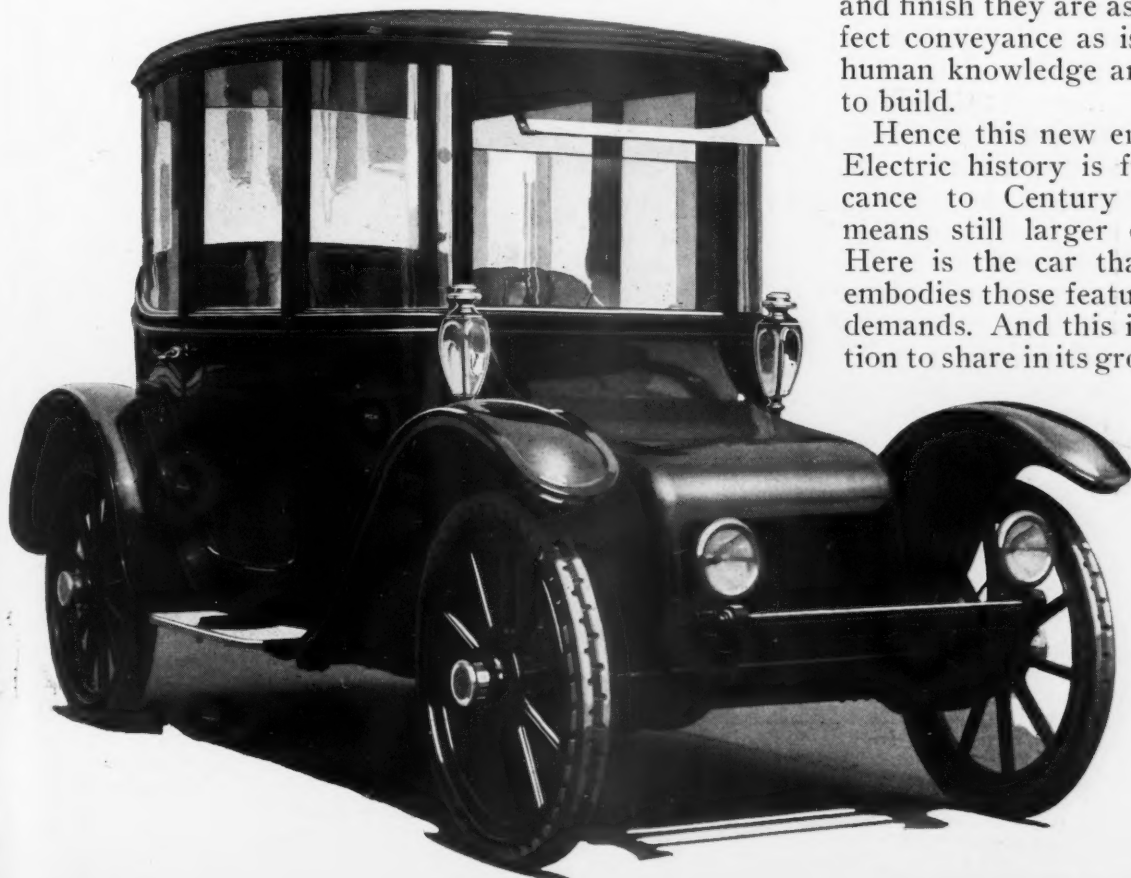
THE present demand and rapidly increasing number of Century Electric owners in all parts of the country clearly demonstrate that when the Century Electric Car Company planned its large increase in production last year it did not misjudge the confidence and conviction of the public regarding this wonderful electric.

And now the Century Electric has entered still another era in its unparalleled progress—an era that means an even greater production of cars to meet the re-

quirements of this year, and the expansion of facilities to provide Century service to this large number of owners—an era that has come naturally as the result of an unqualified success in the building of electric vehicles.

Century Electrics have been built and perfected over a period of nearly three years and today they are in daily service in large numbers in almost every section of the country. In this actual service they have proven, again and again, that in mechanical construction, in design, equipment and finish they are as nearly a perfect conveyance as is possible for human knowledge and experience to build.

Hence this new era in Century Electric history is full of significance to Century dealers. It means still larger opportunities. Here is the car that most fully embodies those features the public demands. And this is your invitation to share in its growing success.



The Century is the Only Electric with All Seven of these Big, Practical Selling Advantages— Check them up

1. *Magnetic Control*

An exclusive feature. Purely electrical. Simple, safe, positive. It makes the operation of the Century as easy as pressing a button for electric light. Controller operated by either hand or foot and from front or rear seats at will. The fact that this is built for us by the Cutler-Hammer Mfg. Co., Milwaukee, the world's largest exclusive builders of Electric Controller Devices, whose product is in use for operating the Panama locks, the gun turrets of U. S. battleships, elevators in thousands of office buildings, etc., is best proof of reliable perfection.

2. *Electric Brakes*

This feature is closely related to the Magnetic Control. Operated through the foot pedal. Slight pressure on the pedal slows down the car. Continued pressure applies the mechanical brakes. You can brake the Century when going at full speed over a wet, slippery pavement—**It Won't Skid.** The operation of the electrical brake is instinctive. It requires no lengthy detailed instructions. A demonstration is conclusive proof.

3. *Duplex Drive*

The Century Duplex Drive is a revelation to electric car users. If you want to change the Century drive from rear to front you simply lift out the small master key and insert it in the front control, take your seat and drive. To change back to rear drive is just as easy. No fussing or straining the memory to recall the order of various operations. Just change the key—that's all.

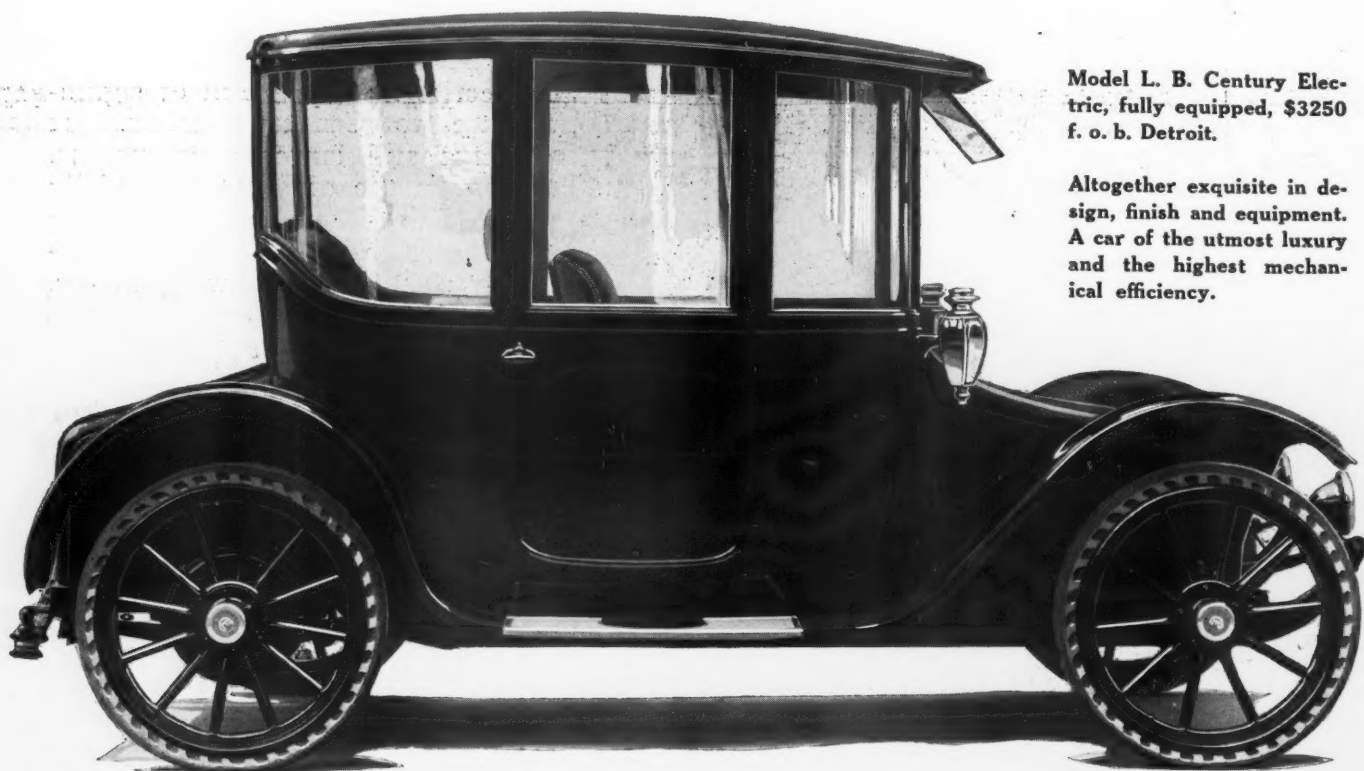
4. *Timken Axles front and rear*

5. *Triple Platform Spring Suspension*

The utmost in luxury of riding. Again a demonstration proves.

6. *Low Body Suspension*

7. *Pure Streamline Body*



Model L. B. Century Electric, fully equipped, \$3250 f. o. b. Detroit.

Altogether exquisite in design, finish and equipment. A car of the utmost luxury and the highest mechanical efficiency.

An Exceptional Opportunity for Dealers

Some Territory Still Open

The increased Century production makes possible larger sales opportunities. That means we can take care of a few more dealers.

Naturally, a car with the magnificent structural superiority of the Century is going to dominate and, of course, that means the Century dealer will be the leading dealer.

The demand today is for true commercial worth.

These cars conspicuously successful have become so, not by chance nor by luck, but by measuring up to the standard of value now demanded by a car-informed public.

The Century Electric is destined for big success, in which Century dealers are sharing and will share because the Century represents the maximum of what the electric car buying public demands. It is the utmost in electric car beauty, luxury, efficiency, and it is honestly priced.

The keener, more discerning and better posted you are on electric car values, the quicker you will recognize this fact.

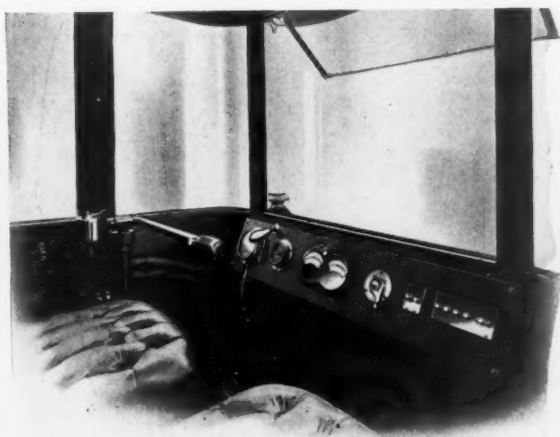
Our policy towards dealers is a liberal one. The first step in carrying out this policy is to take care of our dealers by making prompt deliveries of, what we believe, is the most beautiful and efficient electric car built.

If you have "your ear to the ground" you will write us now—today—and make application for the agency. Tomorrow may be too late.



CENTURY ELECTRIC CAR COMPANY

Detroit, Michigan



An Astonishing Record

Although the earlier cars have now been in service nearly three years, there is no knowledge or record of a Century owner ever having purchased a later model of any other make. A USED Century has never been offered for sale except by ourselves.

Century Electric Car Company

Who are the men behind the Century Electric?

You have a right to know and we want you to know. Look over this list carefully and you will see that they are men of the highest standing in the industrial and financial world. Their connection with the Century is your best possible guarantee of the stability and permanence of the Century organization.

JOHN WYNNE, JR., PRESIDENT:

Director of the German American Loan and Trust Company.

HON. EDWIN DENBY, VICE-PRESIDENT:

Member of the law firm of Chamberlin, May, Denby & Webster. Also Treasurer and Director of the Hupp Motor Car Company and interested in the Federal Motor Truck Company.

PHILIP BREITMEYER, SEC'Y AND TREAS.:

Senior member of the John Breitmeyer & Sons, Florists, and Vice-President of the German-American Bank.

JOHN GILLESPIE, GENERAL MANAGER:

Police Commissioner of the City of Detroit.

WM. M. PAGEL, DIRECTOR:

Member of Gordon-Pagel Company.

GARVIN DENBY, DIRECTOR:

Vice-President, Secretary and Treasurer Federal Motor Truck Company.

HOWARD STREETER, DIRECTOR:

Member of the law firm of Millis, Griffin, Seeley & Streeter.

DEALERS!---Get Further Information

Here is a car of extraordinary merit. Comparison and investigation will prove it. The new era for the Century means a new era for you—use the coupon in the corner and write us.

The Century Electric Car Company Detroit, Michigan

**Century Electric Car Co.,
Detroit, Michigan**

Please send me details of the Century Electric.

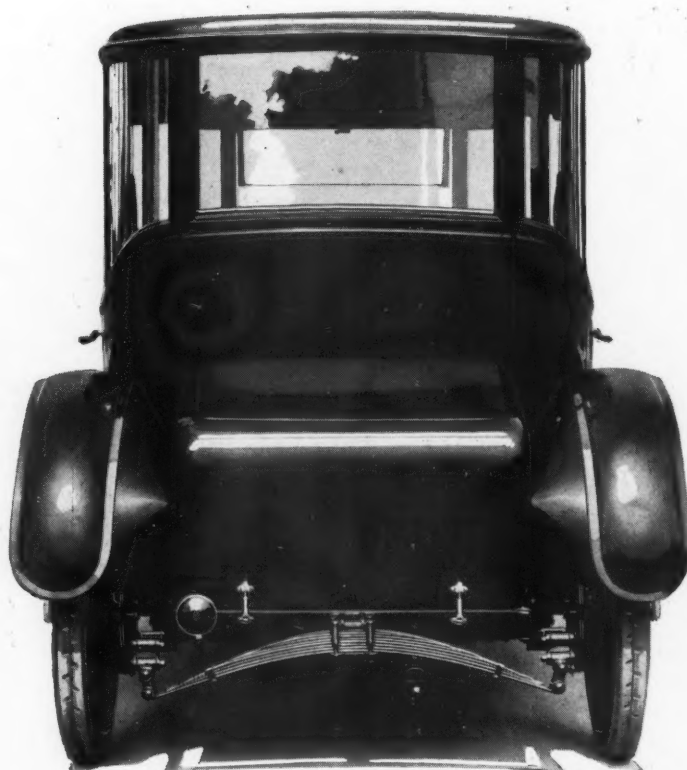
- (a) Proposition to Dealers.
- (b) Catalogue and detailed description.

Name

Street

Town

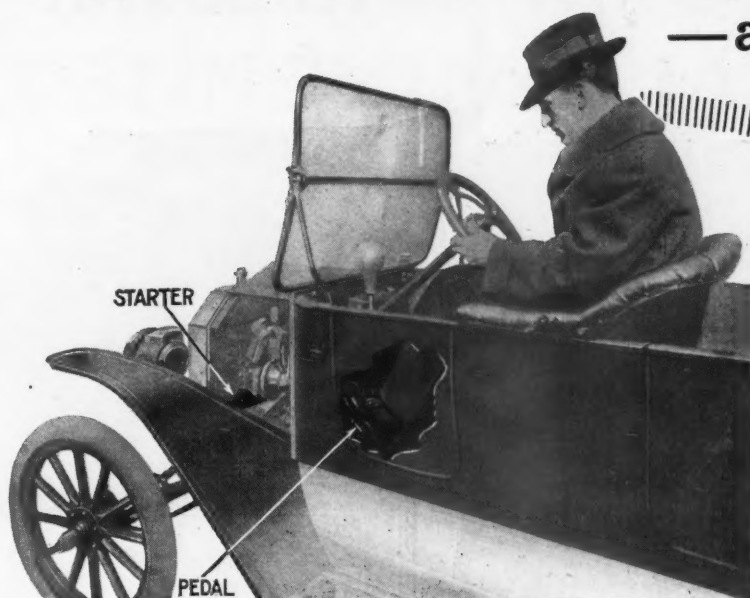
State



Get in and "come along" with the CENTURY

A Real Starter for FORD Cars

—and the price is right



Under the hood, out of sight, compact, simple, powerful, safe and always sure. Roller bearings—installed in an hour's time without alterations. Guaranteed against all defects of material and workmanship.

Just push a foot pedal—it goes!

Easy, quick, simple, safe, isn't it? No more tiresome, inconvenient and hazardous cranking for you—and your wife and the young folks can start with absolutely no risk of strain or injury. The HOUSEL STARTER eliminates the one great "kill-joy" of Ford motoring. Best of all, you can secure this complete starter at a price you can afford to pay—reasonably proportionate to the price of your Ford.

HOUSEL FORD STARTER

A powerful, reliable, mechanical device operated simply by pushing a foot pedal from the driver's seat. By it, even an 18-year-old can give the engine a full throw with little effort. Turns over the engine **twice as fast and far as hand cranking**; to spin the engine push two or three times rapidly on the pedal. Read what an eminent authority, Mr. S. D. Hirschl, Chairman Technical Comm., Chicago Motor Club, says:

"I have carefully examined the starter and have found it to be a device of great merit. It is absolutely positive in its action and sure to release of back-fire. The Starter is proportioned to give ample strength without unnecessary weight or bulk. The examination I have made and the tests were under the most adverse conditions to which I could have subjected the device and convince me that it is the best mechanical starter on the market."

Yours very truly,
S. D. Hirschl.

Only \$25 THE PRICE YOU CAN AFFORD TO PAY

Convenience and safety considered, it's a real bargain. No cranking for your wife, young folks or yourself—no risk of strained backs, broken arms and wrists—no worry when the folks are out alone. \$25 includes the complete outfit—Starter, foot pedal, new connections—everything. Send your order today through your dealer, garage man or direct to us—money back if you are not satisfied with it on delivery.

Write for **Free Illustrated Folder** at once.

CENTURY FOUNDRY CO.

(Successor to Housel Mfg. Co.)

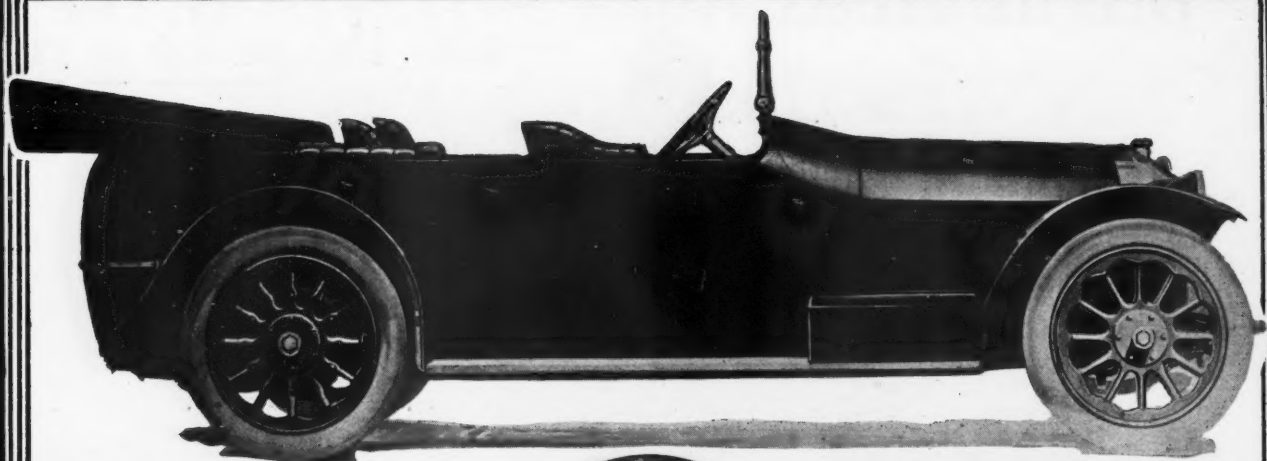
1622 N. Salina St.
SYRACUSE, N. Y.

Real Discounts
to
Dealers

This starter is efficient—at its price will sell on sight to Ford buyers and owners everywhere. Write at once for attractive trade prices to Ford and all Dealers,

Garage and Repair Men

When Writing to Advertisers, Please Mention Motor Age.



PATHFINDER

PICK YOUR LINE RIGHT

If you are building a permanent and profitable automobile sales business, you must pick your line right. Salesmanship must be backed by good goods, priced right, to insure your success.

Pick a line of Sixes because the greatest number of real automobile buyers are demanding Sixes. Pick a line, the models of which are priced within reason, because automobile buyers no longer relish the idea of paying exorbitant prices even for good Sixes.

The Pathfinder line is made up of two six-cylinder models, Daniel Boone \$2222, Leather Stocking \$2750. One a light Six, the other a big Six.

They are both perfect cars, and each gives service, each gives speed and power together with comfort and style not equaled by any other car, four or six, approaching the price mark that they have established.

These are the reasons why the Pathfinder line offers the basis for your success and this basis is supplemented by the most intelligent selling plan ever devised for the practical merchandising of motor cars.

Write us for particulars—and the plan

MOTOR CAR MANUFACTURING CO.

1130 Division St., Indianapolis, Ind.



197 A.

When Writing to Advertisers, Please Mention Motor Age.

If ALL Tires Were PENNSYLVANIA *Oilproof* VACUUM CUP TIRES



SKIDDING on slippery pavements — the greatest single cause of automobile accidents — would be unknown.

V. C. tires have been guaranteed for many years not to skid on wet or greasy pavements, else returnable at purchase price. Never a claim from a user.

Tire trouble and expense — the greatest drawbacks to the use of automobiles — would be so normal and nominal as to constitute the least of all motoring complaints.

V. C. tires are guaranteed for a low minimum of 4,500 actual miles and maintain an average nearer twice that distance.

The oiled road would be a *complete* comfort — not to be avoided, but enjoyed.

V. C. tires are guaranteed absolutely immune to the rubber destroying effects of oil.

Every year adds enormously to the number of those who know Vacuum Cup Tires as the **ONLY** tires for utmost safety and service. 1914 has already broken previous yearly records.

SOLD EVERYWHERE

Pennsylvania Rubber Co., Jeannette, Pa.



New York	Boston	Los Angeles	Minneapolis
Chicago	Pittsburgh	Detroit	Omaha
Cleveland	San Francisco	St. Paul	Kansas City, Mo.
Seattle	Dallas	Atlanta	

An Independent Company with an independent selling policy

Our Ear to the Ground

It is one of our customs to go out in motoring places incognito, so to speak, to feel the temper of prevailing opinion in regard to the various makes of tires.

This always proves a very satisfying experience—and it grows more satisfying all the time.

What we hear is not only of great assistance in our advertising, which is largely based on the viewpoints of users of Vacuum Cup Tires, on the theory that as their qualities appeal to these users so they will appeal to those who have not yet become users. But we also find great encouragement to proceed right along our established lines, and continue to make Vacuum Cup Tires just exactly as they are.

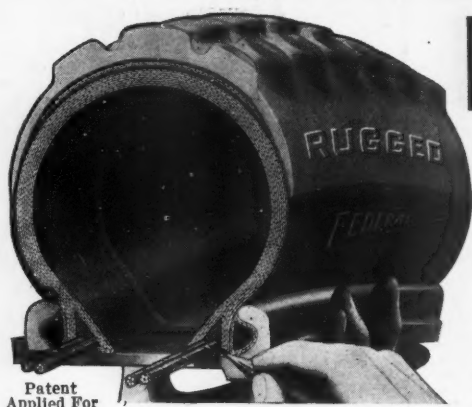
And we will add that we would not trade the impartial things we thus hear of our product for all that we hear of all other tires combined.

We are asking dealers to order a little further in advance of stock requirements than is customary, to help us give the timely deliveries we are striving to maintain.

**Pennsylvania Rubber Co.
Jeannette, Pa.**

Typical advertisement of the Vacuum Cup campaign running in The Saturday Evening Post and all the prominent weeklies and monthlies.

An Independent Company with an Independent selling policy



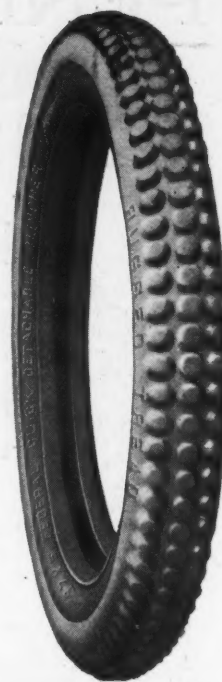
Patent
Applied For

Made in straight wall and quick detachable clincher styles. All sizes for standard rims. Rugged and plain treads.

wall blowouts due to broken fabric just above the rim, tube pinching, and the danger of tires slipping off their rims.

The exclusive Federal construction defeats these four common and costly tire troubles by the use of heavy double cables imbedded in a soft bead-filler in the base of the tire. These cables anchor the tire firmly to the rim, and the soft bead-filler cannot cut and grind into the side-wall as does a hard sharp-pointed bead-filler.

Federal Tires are the only tires made with double-cable-base construction. Specify them.



RUGGED TREAD

is of much heavier construction than the ordinary "non-skid" treads. It is double thick and gives extra service. The big thick round projections, set in parallel rows, are the only scientific skidding protection.



Pure Para Inner Tubes

Federal inner tubes have distinctive points of superiority that raise them far out of comparison with ordinary tubes. Federal tubes are made of pure para rubber, the highest quality, and built up layer by layer. They are heavy, seamless and always flawless.

On Federal tubes, the valve re-inforcement is not cemented on but vulcanized integral with the tube. Federal tubes do not stretch out of shape. Don't skimp on your inner tubes. Buy them with as much care as you do your casings. Ask your dealer for Federal Tubes.

DEALERS Federal dealers are supplying a big demand created by Federal quality and Federal advertising

FEDERAL RUBBER MFG. CO., MILWAUKEE, WIS.

Branches, Distributors and Service Stations in all Principal Cities. Dealers Everywhere.



Announcing

1915'S "SIX" SENSATION!

A NEW automobile epoch is crystallized in the wonderful new Lewis "Six" which we now announce—a remarkable 6-cylinder, 6-passenger car of 135-inch wheel base, luxuriously finished and upholstered—bristling with myriad new luxuries and conveniences that \$3000 car buyers a year hence will be offered—at \$1600! The history-making car of 1915 is the

New LEWIS "Six"

Monarch of the "Sixes"

At the 4-cylinder price you are now entitled to the Monarch of "Sixes" with all its delightful new driving sensations, the velvety riding qualities of the long wheel base, the amazing beauty of the true European stream-line body, the extra capacity of the 6-passenger car, the comfort of divided seats over exceptionally wide underhung springs and countless other features.

The Masterpiece of a Famous European Designer

The new Lewis is M. Petard's masterpiece. M. Petard was formerly with such famous cars as the Fiat Italia, Daracq, Unic., His is the first American car wholly designed by a chief engineer who first-hand has had the wonderful European practice that all American engineers superficially copy.

The Lewis is the first American car wholly designed by M. Petard.

He has placed the new Lewis in front of every American car because of the first hand European advancements he

applied. We are two years ahead with many features—why wait until 1916 and 1917 for them in other cars?

You buy no experiment when your choice is a Lewis. The Lewis is produced by men who have been building cars since the very inception of the automobile industry. The president of the L. P. C. Company is William Mitchell Lewis.

The Most Economical "Six" in Motor Car History

This is the most economical "Six" the motor world knows. Road tests showed 18 to 19 3-5 miles to the gallon of gasoline. A record few 4-cylinder cars equal. Thus we eliminated the last drawback to the six, for our motor is the small bore type, 3 1/4 inches, while the stroke is 6 inches. This strikes the limit in conserving gasoline. The power and stamina of the car are wonderful. There are few hills in America that will make you shift to second gear.

Features

135-inch Wheel Base
6 cylinder tests: 18 to 18 3-5 miles to gallon
Monobloc Motor: bore 3 1/4 in.; stroke 6 in.
6-passenger Pure Stream Line Body
Crowned Fenders
Light Weight—3250 lbs.
Cowl Dash
Self-Cranking System
Electric Lighted; Electric Horn
Simplicity—Approximately 1200 Fewer Parts
Big Tires—36x4; Demountable Rims
Wide 22-inch Doors
Left Drive; Center Control
Underhung Rear Springs; Wonderful Easy Riding
Roomiest Body Built
Silk Mohair Tops; Jiffy Curtains; Nickel Trimmings

We furnish 1 horsepower to every 51.5 pounds—other cars average 1 horsepower for 75 to 90 pounds.

Get the New Catalog—See the Car Today

Go see this remarkable car—the world's greatest motor car value—at the nearest Lewis dealer. It is on exhibit now. But first write for our new catalog, a fascinating recital of how this car came to be created—and the complete story. This book marks a new milestone in motor car design—you should not miss it—write today to

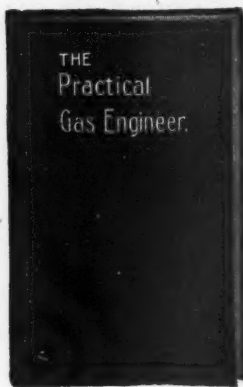
L. P. C. MOTOR COMPANY

543 Lewis Street,

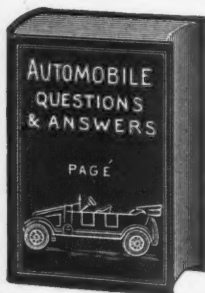
Racine, Wisconsin

A Word to Dealers

There are a few territories where good dealers can advantageously handle the new Lewis. If yours is one, we welcome a wire or letter—send it today.

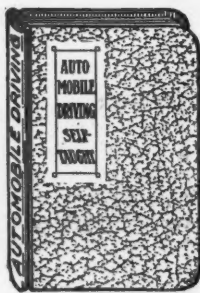


PRACTICAL GAS ENGINEER. By E. W. Longnecker. Twelve years' constant experience with Hydro-Carbon Engines. How to start, how to operate, and how to care for all classes of explosive motors or engines using gas, gasoline or similar fuels. A full and exhaustive chapter on electric and other systems of igniting. Every line tells something. Every page full of interest. A book of 172 pages, neatly bound in cloth. Sent postpaid on receipt of price, \$1.00.



QUESTIONS AND ANSWERS relating to automobile design, construction and repair, by Victor W. Page.

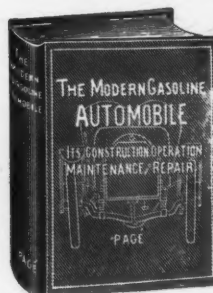
A practical treatise consisting of a series of 36 lessons, covering some 2,000 questions and their answers. Subject matter is correct and explained in simple language. A feature of this book is the treatment of some of the most important motor ailments, their causes, effects and cure. Price (cloth) \$1.50.



AUTOMOBILE DRIVING SELF-TAUGHT.

By Thomas H. Russell, M.E., LL.B. An exhaustive treatise on the Management, Care and Operation of Motor Cars. Pocket size, 230 pages, liberally illustrated, handsomely bound in black seal flexible leather, round corners, red edges.

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MODERN GASOLINE AUTO-MOBILE. By Victor W. Page, M.E.

Its construction, operation, maintenance and repair. 700 pages, 500 illustrations. A late and complete treatise on the modern motor car. Free of technical terms, yet complete in every detail. Covers all phases of motor car practice. Price \$2.50.



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910 S. Michigan Avenue, CHICAGO

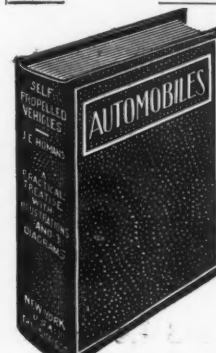
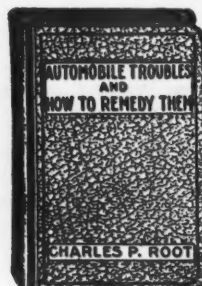
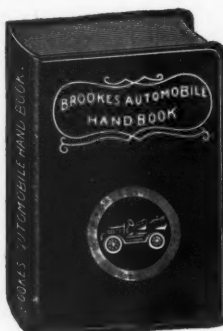
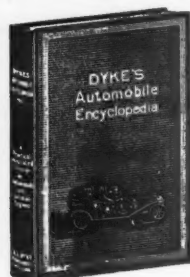
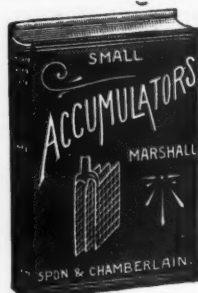
SMALL ACCUMULATORS. How Made and How Used. By P. Marshall. An elementary handbook for students and beginners, discussing theory and practice in the construction of small storage batteries, with instructions for charging and using batteries. Size, 4 1/4 x 6 1/4. Pages, 80. With illustrations. Cloth boards, 50 cents.

DYKE'S AUTOMOBILE ENCYCLOPEDIA. by A. A. Dyke, E. E. 560 pages. Over 1,000 illustrations. Teaches the Principle, Construction, Operation and Repairing of cars and engines. Covers all valve systems; ignition; carburetion; care of car; adjusting and repairing; digest of troubles; a good index which is handy for the repairman. Electric Starting and Lighting Systems; construction, principle, care of and operation. Simplified so anyone can understand. Prepared for the novice, but a handy and reliable reference guide for the expert. Price \$3.00.

THE AUTOMOBILE HANDBOOK. By L. Elliott Brookes. 700 pages and over 320 illustrations. New enlarged edition. Popular edition, full leather limp, \$2.00 postpaid. A work of practical information for the use of Owners, Operators and Automobile Mechanics.

AUTOMOBILE TROUBLES AND HOW TO REMEDY THEM. By Charles P. Root, former editor "Motor Age." Pocket size: 5x7 inches, 252 pages, illustrated, handsomely bound in red flexible leather, round corners, red edges. The only book of its kind published. It not only tells you how to locate troubles and make repairs, but shows you. Price, flexible leather, \$1.50.

SELF-PROPELLED VEHICLES. By James E. Homans, A.M. A practical treatise on the theory, construction, operation, care and management of all forms of automobiles, with upwards of 500 illustrations and diagrams, giving the essential details of construction and many important points on the successful operation of the various types of motor carriages driven by steam, gasoline and electricity. This is probably the best comprehensive treatise published in simple language, so that the contents may be readily understood by the intelligent reader. It is an excellent work to begin with before going deeper into the subject. Size, 5 1/4 by 8 1/2. Pages, 652. With Drawings and Half-Tones. Cloth \$2.





From accurate clocks and other forms of measuring devices, springs have been discarded as inaccurate and unreliable.

Temperature changes affect springs.

Internal friction produced by constant depression and extension tend to make the metal brittle and alter its physical qualities.

Hence—springs are never used where a high degree of precision is required.

Your carburetor cannot be kept accurately adjusted if it has springs in it, any more than a pair of scales can.

All springs have been entirely eliminated from the new self-adjusting Holley—the modern no-moving-parts carburetor which over 225,000 owners are using—a carburetor with only one adjustment, operating scientifically according to well known Hydraulic Laws—so automatic in its action that it accommodates itself readily to varying temperatures and air pressures.

Over 225,000 now in successful use.

You can have one on your car if you desire.

HOLLEY BROTHERS COMPANY, Detroit, Michigan

When Writing to Advertisers, Please Mention Motor Age.

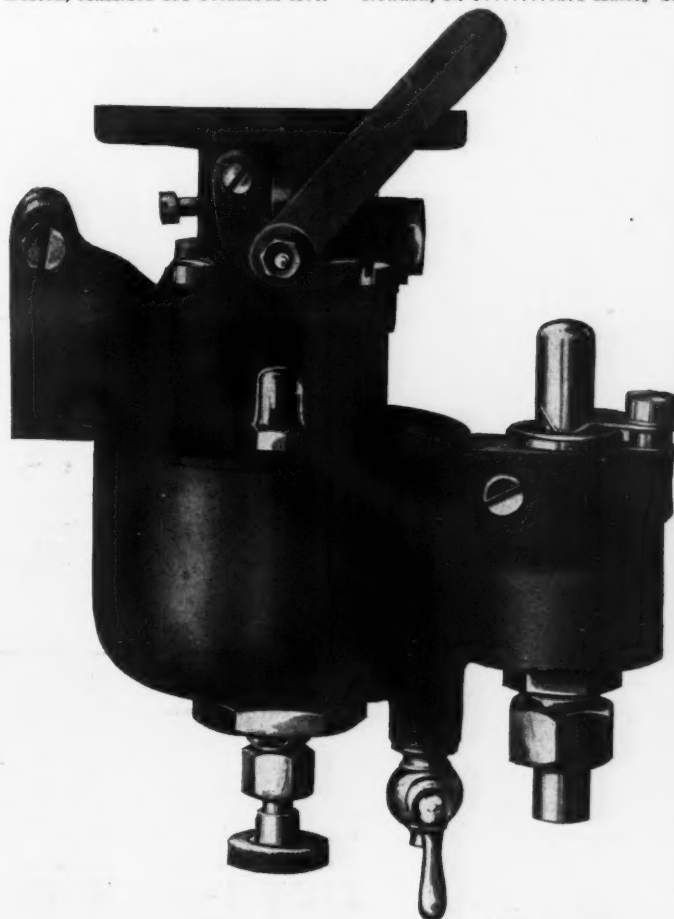
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 Seattle, Wash. Hughson & Merton, 924 East Pike St.
 Holley Carburetors are carried in stock at the following addresses: CHAS. E. MILLER, Home Office: 97-103 Reade St. and 121 Chambers St., New York.

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Herff-Brooks

Six

\$1375

Specifications

48 H. P., 6-cylinder motor.
4-inch bore and 4½-inch stroke.
124-inch wheelbase.
Electric starter, lights and horn.
Semi-elliptic springs in front.
¾ elliptic springs in rear.
One piece drop forged I beam front axle.
Timken and New Departure Bearings.
Demountable rims with extra rim.
18-inch steering wheel.
Center control.
Cone clutch.
Clear vision wind shield.
Mohair top and curtains.
Speedometer.

Why Pay More for a Six?

Have you realized that a handsome, efficient six cylinder automobile can be built today for \$1375?

Why shouldn't it be possible? The difference between a four and six cylinder car of equal power is almost wholly in the motor. The increased manufacturing expense is not large. Why then pay more than \$1375?

Six Cylinder Prices Are Too High

You know the history of four cylinder automobile prices. How they were high at first and slowly came down? And how two or three famous four cylinder cars were always a little ahead of the rest in value?

The same thing is now coming true in the six cylinder field.

The Herff-Brooks Six is a year or two ahead of the rest. That's all. Others will follow by and by. But why should you now pay more than \$1375 for a six?

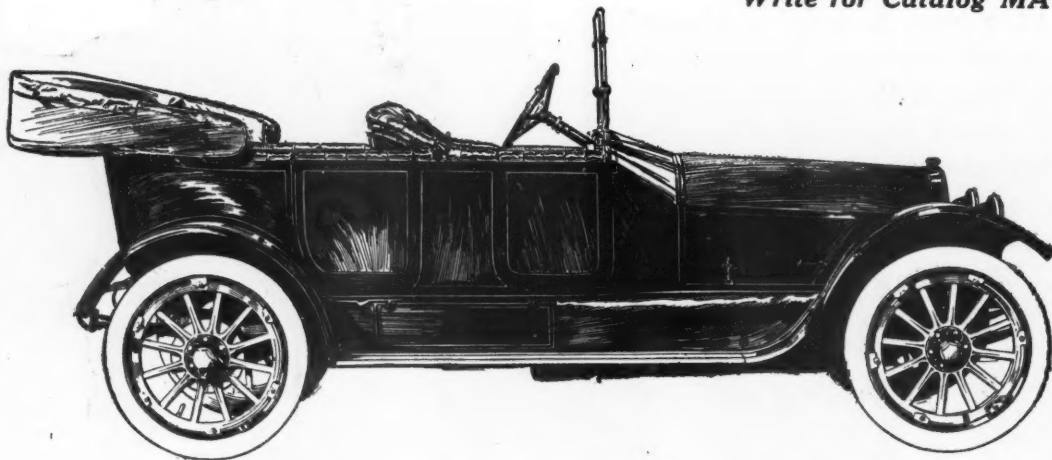
We Urge You to Make Careful Comparisons

The best evidence we can offer you is the car itself. Don't simply look it over. Make the most studied comparison you can. Look into the finish, the design, the materials, the bearings, the construction, the equipment; and then let the car's performance be the deciding factor.

Don't hesitate to compare the \$1375 Herff-Brooks with \$1575 Sixes alone, go on up to \$1700 Sixes and still further to \$2,000 cars. We have yet to lose a single prospect who measured the Herff-Brooks by \$2,000 standards.

We don't need to urge you to get to this car immediately. We simply tell you about it. Isn't that enough? Will you, for one, be willing to pay more for a Six before you have seen the Herff-Brooks at \$1375?

Write for Catalog MA

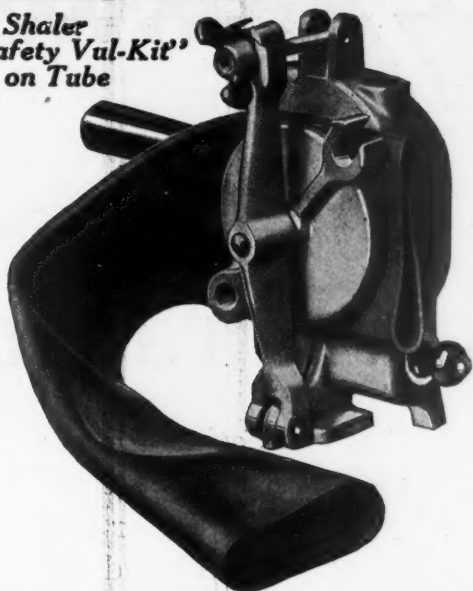


Herff-Brooks Corporation

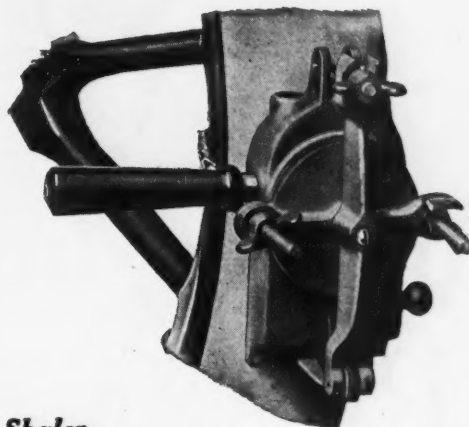
235 Pennsylvania Avenue,

Indianapolis, Indiana

Shaler
"Safety Vul-Kit"
on Tube



Shaler
"Safety Vul-Kit"
on Casing



The Accessory Sensation of the Year!
— a Genuine

SHALER
SAFETY VUL-KIT
Vulcanizer

\$3.50

Saves Tires—Saves Repair Bills—Can be Carried in Tool Box

At last — after months of experiments and tests we have finally perfected a Shaler Vulcanizer for repairing tubes and casings, that can be carried in the tool box and can be operated anywhere at any time. We now announce the "Shaler Safety Vul-Kit" at \$3.50 — the lowest priced — really efficient Vulcanizer made today.

No Burning Flame—No Danger of Fire If Accidentally Upset

No watching, no regulating; simply fill the cut or puncture with new rubber, clamp on the Vulcanizer — fill and light the generator. The fuel supply is limited to that required for perfect vulcanization. No more — no less. You can't overcure or undercure.

Tubes are clamped against the vulcanizing surface by a swivelled plate inlaid with asbestos to retain the heat and prevent pinching the tube. You can't accidentally spoil a repair or tube by clamping one side of the plate tighter than the other. Handle, always cool, permits removing Vulcanizer from tire as soon as repair is finished. Anybody can use it. Furnished complete with repair material — everything but the fuel. Fully nicked — will last a lifetime.

FREE—Book on "Care and Repair of Tires"

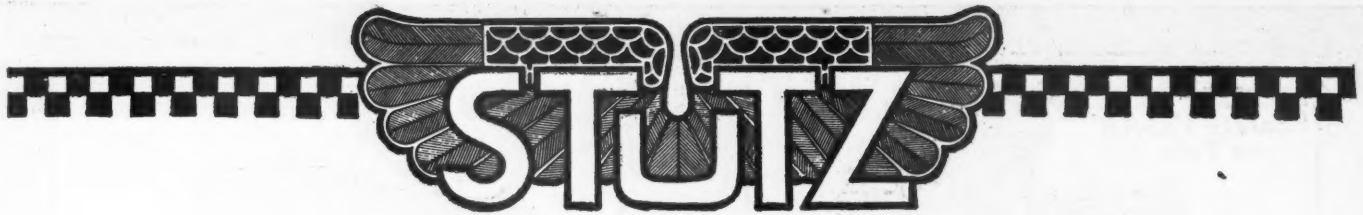
Contains valuable tire information that every motorist should know and it explains all about tire troubles and their causes — how to care for tires — and hints on how to get more mileage. The leading American and Foreign Automobile Journals quote this book as an authority. We will send a copy free on request — together with full particulars about the Shaler Safety Vul-Kit at \$3.50.

The C. A. Shaler Company, 221 Fourth St., Waupun, Wis.

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**The Shaler Line
Is Complete**

We are the world's largest Manufacturers. We make Vulcanizers of every type — electric — gasoline — alcohol and steam. The Shaler is the standard used in the best garages and repair shops everywhere. The Shaler line complete from this new Safety Vul-Kit for the home garage to complete garage equipment.



Official Road Race Champion

Why we believe in racing

RACING a car is concentrating its use. It is subjecting the car to every possible disadvantage in the shortest possible time. Out of every important racing event has grown a better and truer Stutz—the kind you buy. We race to learn. We build for safety. We seek to develop our chassis to the highest point of efficiency.

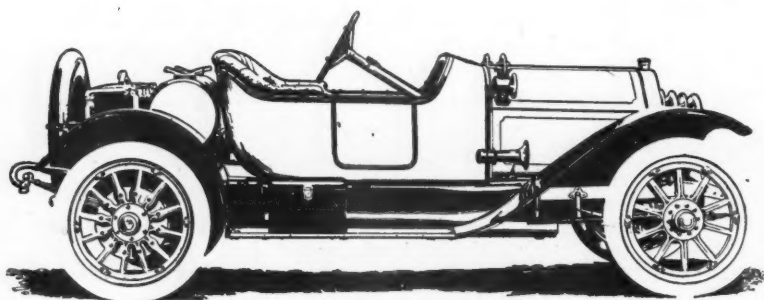
And once learned, the lessons of the speed course are not soon forgotten.

We take no chances. Whether the Stutz is built for speedway or road racing or for the long distance grind of every-day service—the owner's own marathon—the Stutz is well fitted for the task before it.

We stake our reputation upon the performance of the Stutz in every-day use. The Stutz is a winner because it is honestly built by men who know how—an organization of experts.

Judge the Stutz by the standard of actual performance and continuous trustworthiness.

VISITING DEALERS: You are invited to call at our factory and see how the Sturdy Stutz is built. Let us send you a complete Stutz racing record, and Catalog A-2.



\$2000—4-Cylinder ROADSTER 6-Cylinder—\$2250

TORPEDO ROADSTER

4 $\frac{3}{4}$ x5 $\frac{1}{2}$ T-head motor, large valves, force feed oiling system through crank shaft, 120-inch wheel base, electric lights and starter.

Colors: Vermillion, monitor grey or mercedes red.

STUTZ MOTOR CAR COMPANY
INDIANAPOLIS



*In the Picture—
a Week's Output
—Twenty - Five
Thousand Rims.*

Tires Last Longer on Stanweld Rims

THE best tire built is soon made inefficient if fitted to an imperfect rim. Makers of few rims cannot afford to spend the time, money, and energy spent to make Stanweld Rims the most perfect rims.

Stanweld Rims are made of a special steel. Every lot of steel is tested before being made into rims, and the rim is again tested for strength when finished.

Stanweld Rims are inspected three times for accuracy, form, smoothness, and ease of operation. There is another point, however, that means more from the standpoint of tire-economy than anything else. That point is design.

Take Stanweld Number Sixty Rim, for instance. It is the only rim from which a tire can be removed without stretching or pulling. That's a great advantage. No tire will return to its exact original form after being pulled out of shape.

Then again, Stanweld Number Sixty Rims can be changed from clincher to straight-side type by merely changing the side rings. When used for straight-side tires the Number Sixty allows greater spread of the tire at the base than any of the old-style rims—greater air-space, greater riding-comfort, more tire-mileage.

Nearly every car sold with demountable rim equipment can be purchased with Stanweld Number Sixty Rims at no additional cost—if you just ask for them. Or, if you already own a car, you can equip it with Number Sixty Rims for very little money. Then you'll have the best rim-equipment made, and you'll save your time, temper, strength, and a large part of your tire-expense.

The main office is glad to furnish any one with complete information about the Number Sixty Rim, or any other type of rim.

Just write a letter or post-card today.

The Standard Welding Co.,

Cleveland



Maxwell "25"

The Car That Is Making New Automobile History

The Maxwell "25" is today the automobile sensation of the United States and all Europe.

To the automobile world the Maxwell "25" was an unlooked for achievement—an epoch-making triumph.

The Maxwell "25" is a hundred times more than merely a car at \$750—it is a superbly finished, big, roomy, graceful, powerful five-passenger automobile.

The Maxwell "25" has every essential quality, and every necessary feature found in the very highest-priced cars.

It is an automobile that stirs your enthusiasm, an automobile that anyone is distinctly proud to own.

The Maxwell "25" looks and acts like a high-priced car, because it is a high-priced car—sold at a popular price.

See the Maxwell dealer in your town at once, and look at this wonderful, complete car. If there is no Maxwell dealer near you, write for interesting, illustrated, descriptive catalog.

Address Dept. E

Maxwell Motor Co., Inc., Detroit, Mich.



"That beautiful stream-line Car"

EISEMANN

The Eisemann system for Ford cars lays claim to superiority not alone because of the superiority of the magneto itself but to the further fact that the entire system is designed and built looking solely to quality and efficiency.

Gears, two of them only, are used for driving purposes. This makes for the most practical and foolproof drive possible. In addition to being right in principle the gears used in Eisemann construction are the finest obtainable. This means that they are noiseless and practically wear proof.

In fact the Eisemann system is so refined as to be absolutely noiseless in operation from the date of its installation to the last shot whenever that time may come.

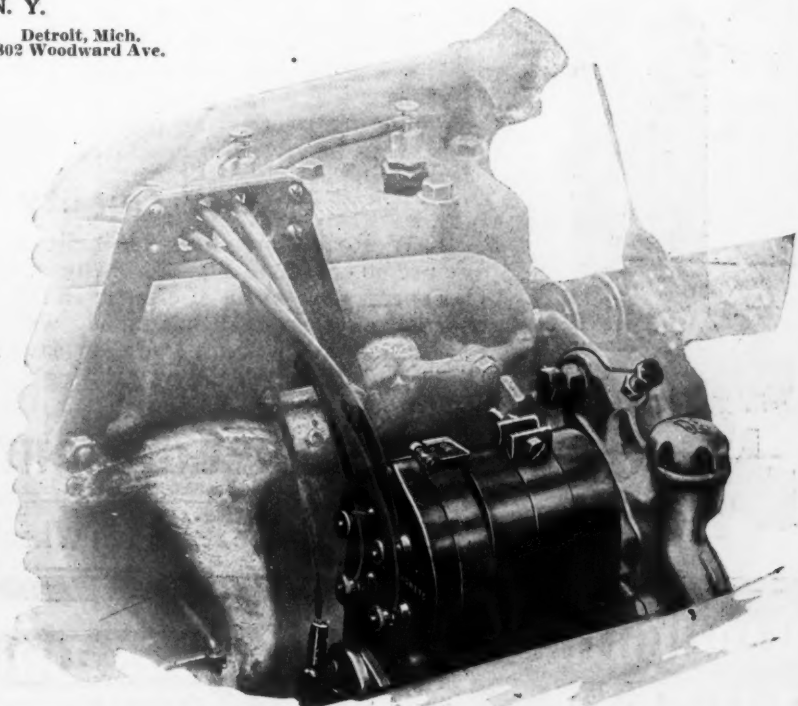
Installed this system becomes a simple integral part of the whole car rather than a cheap makeshift attachment.

Only Finest Gears
are used in
Eisemann Ford System

The Eisemann Magneto Co.

Sales and General Offices
32-33d St., Brooklyn, N. Y.

New York	Indianapolis, Ind.	Detroit, Mich.
123 W. 52d St.	514 N. Capitol Ave.	802 Woodward Ave.



When Writing to Advertisers, Please Mention Motor Age.

HIGH *and* LOW TENSION MAGNETOS



MASTER VIBRATORS ROAD SMOOTHERS AUTO LOCKS

Smooth Riding on Rough Roads



That enviable pleasure of comfortable motoring—regardless of how rough the roads, or how fast you drive—is yours, made possible by



Road Smoothers

Reg. U. S. Pat. Office

Quickly Applied to Your Ford Car

They take the roughness out of the road and eliminate the pitching, swaying and vibration that racks and shortens the life of your car. K-W Road Smoothers seem to level off the high places and fill up the low places. Wherever you ride the bumps and jolts are gone—ironed out by the K-W Road Smoothers. They give you **big, heavy car comfort**, combined with **light-weight car advantages**. They save tire and gasoline bills and add greatly to your safety and the life of your car.

The "anti-rebound air chamber" prevents the rebound of the spring. It is an essential feature and found **only** in the K-W Road Smoothers.

The "anti-side-motion links" of the K-W Road Smoothers prevent side rocking and swaying when turning corners, and greatly reduce any tendency to skid.

There are no wearing parts or friction surfaces, consequently no oiling or packing in grease is necessary. No attention required after installation.

K-W Quality Throughout

K-W Road Smoothers are built of the very best materials obtainable. We use no cheap castings, but instead, high-grade, heat-treated drop forgings. Our springs are made of electric smelted chrome, Vanadium steel—the most expensive spring steel that money will buy. They will not bend—they will not break—they will not lose their easy riding qualities because K-W quality is built into them all the way through.

\$25 Set of Four
One For Each Wheel

The principle is right—the design is right—the workmanship is right—and the price is right.

K-W Road Smoothers are sold by reliable dealers everywhere. If your dealer cannot supply you, we will send a set direct to you on receipt of price. Don't confuse these with ordinary shock absorbers. Write for free booklet—"Taking out the Bumps." We will gladly send it on request.

HEADLIGHTING OUTFITS

THE **K-W** IGNITION CO.
2835 CHESTER AVE. CLEVELAND, OHIO, U.S.A.

SPARK COILS SPARK PLUGS

20 Reasons for Buying a 1915 Chalmers "Light Six"

- 1 **It is a manufactured—not an assembled car.** Built complete in the Chalmers shops by Chalmers trained workmen under rigid Chalmers inspection.
- 2 **Supremely good looking.** Streamline body, clean running boards, oval fenders, fine finish and attractive color. Pronounced by experts "the best looking car on the market."
- 3 **Easy riding.** Long wheel base—126 inches. Long flexible springs; main leaf of Vanadium steel. Rear springs under-slung.
- 4 **Medium weight.** Lighter than most fours selling at the same or greater price; heavier than any of the so-called "light sixes." Scientifically tested for a four-fold margin of safety, yet light enough to be economical; no flimsiness—no unnecessary weight.
- 5 **Roadability.** Weight perfectly distributed, hence no tire destroying side-sway. Concentric torque tube and perfect spring suspension make car hold well to any road.
- 6 **Non-stallable motor.** Chalmers-Entz electric starter won't let motor stop. Greatest element of motor safety ever introduced. Makes car safe and easy as an electric for a woman to drive.
- 7 **Convenience.** Left-hand drive, center control, entrance or exit from either side of car. Starter and ignition switch, electric light control, carburetor adjustment, gasoline and oil gauges, speedometer on cowl board of dash. Motor and all lubrication points accessible.
- 8 **Big power; small motor.** Chalmers built. Even the castings made in Chalmers foundries. Small bore, extra long stroke ($3\frac{1}{2}$ " bore by $5\frac{1}{2}$ " stroke) develops unusual power. Very large Tungsten steel valves. Will not warp or pit, so no power is wasted. T-head design gives the smoothness of the turbine—the flexibility of steam.
- 9 **Practically unnecessary to shift gears;** widest range of speeds on high. Such flexibility possible only in a "six" and rare even among "sixes."
- 10 **Absence of vibration.** All moving parts of motor perfectly balanced. Long stroke, six-cylinder motor gives steady pull and sweet running. No intermittent power strokes pounding ceaselessly at bearings, cylinder walls and gears. Upkeep expense reduced to minimum.
- 11 **All valve mechanism fully enclosed.** Large oval cams open and shut with velvet smoothness. Perfect lubrication eliminates noise of operation.
- 12 **Simplest design of any "six."** Single unit ignition. Honeycomb radiator, cooling without complicated pump. Elimination of many moving parts cuts down weight and expense.
- 13 **A Safe Car.** Frame of heavy, channel section pressed steel. Drop forged steering connections. Heavy artillery type wheels. Brakes 25 times as powerful in proportion to weight as those on a locomotive. Chalmers built axles of highest quality heat-treated steel.
- 14 **Large bearings,** positive lubrication, heat-treated gears, highest quality of materials insure least wear and minimum upkeep expense.
- 15 **Generously large.** A "Light Six" but not a "little six." Seats wide and deep. Ample leg room, both front and rear. Doors exceptionally wide. Luxurious upholstery.
- 16 **1915 refinements.** The Master "Light Six" is a year ahead in design. All moving parts enclosed. Transmission gears interlocking. Doors hung on invisible hinges. Doors flush fitting without moulding. Running boards clear. Gasoline tank can be filled without disturbing passengers.
- 17 **Fully equipped.** Mohair top, quick acting curtains; rain-vision windshield; five demountable rims; tire carrier at rear; electric lighting system with Chalmers combination headlights; speedometer, electric horn, license brackets, full set of tools, tire repair outfit.
- 18 **Fastest selling "Six."** The "Light Six" is the most popular car ever built by the Chalmers Company. 1568 cars were shipped in April, an average of 60 cars per day. **In this one month alone the public paid \$3,000,000 for Chalmers "Sixes."** Buy the car the motor-wise have decided is best.
- 19 **Because it's a Chalmers.** This means that back of the Master "Light Six" stands one of the largest and strongest manufacturing companies in the United States. It means that the dealer you buy it from stands back of the car to see that you get satisfaction and full value.
- 20 **Price, \$1800.** Experts say the Chalmers "Light Six" is the greatest value ever offered at \$1800. But mere figures can't express the real worth of such a car to you and your family. Ask your wife if this isn't the kind of car she wants. Ask her if it won't be worth many times its price in health and recreation for the whole family. Bring her with you to see the Master "Light Six"—together you will decide such beauty and value were never before offered at \$1800.



*This monogram stands
for all you can ask
in a motor car*

See this wonderful new 1915 "Light Six" at any Chalmers dealer's. Ask him to give you the Chalmers Standard Road Test, which proves every claim we make

1915 "Light Six" Touring Car	\$1800	Larger "Master Six" 5-passenger	\$2175
1915 "Light Six" Coupelet	2050	Larger "Master Six" 6-passenger	2275

(Fully equipped, f. o. b. Detroit)

Chalmers Motor Company, Detroit

When Writing to Advertisers, Please Mention Motor Age.

MAKE \$250.00 A MONTH Repairing AUTO Tires MOBILE

Sounds like a lot of money—IT IS—A WHOLE LOT of MONEY to be earning CLEAR every month—yet it's what hundreds of men we have established in the Automobile Tire Repair Business are making. You let down the DRAW BRIDGE for SUCCESS to enter into your career by getting into business for yourself. The business for you is the one where investment is small—the returns quick and for cash—where the margin of profit is large—the demand for your PRODUCT or SERVICE constant and ever on the increase.

A HAYWOOD TIRE REPAIR EQUIPMENT

answers to all of these requirements of Old Dame Fortune—The certainty of success in this business is as sure as anything in this world can be—Each year adds thousands of new Automobile Owners—they need YOU to keep their tires in service.

Here Is Your Opportunity!

Be first to enter this new big paying business in your town. Open your pockets. Let the dollars pour in. Act quick. Every auto sold means more tires to mend. Automobile business is growing fast—enormous field for tire repairing. Punctures and blowouts are common. Tires need retreading and vulcanizing. Something going wrong all the time. Thousands forced to buy new tires because they can't get old ones fixed. Think of the old bicycle days—repair shops on every corner—all making money—busy day and night. Autos make same proposition over again—only ten times bigger and better. Users of Haywood Tire Repair Plants are making big money. Johnson, Tex., writes: "I have made as high as \$18 in a day." Another man who bought a plant September, 1911, writes he has cleared over \$3000.00. That's going some! Operate a plant as side line in connection with auto business—garage or as an independent business. Find neighborhood where there's a bunch of autos—get all the steady business besides transient work. Experience unnecessary. You learn quick. Simply follow directions—practice a few days on a couple of old tires and you'll be ready to coin money. Business comes fast and easy.

Repair Tires At Home

Young men! and boys repair father's tires—get money he pays garage man. Get the neighbor's work. Make money to attend college or to start a garage and repair business.

Auto Owners—Repair your own tires—save money—pay for your outfit in short time. We have outfits for home use. Anyhow, investigate. Send today for catalogue. See the wonderful possibilities in this marvelous field. Learn of the enormous money-making opportunities in this fascinating new business.

Haywood Tire & Equipment Co.
720 N. Capital Ave., Indianapolis, Ind.

The New Money-Making Business
—Start Now—This Man Is Making Money

Business Keeps Coming



The C. A. C.

America's first Automobile Cyclecar, because it embodies all those features found in any high-grade, high-priced machine. Designed by C. A. COEY—America's Premier Motorist, with fourteen years of constant experience.

The C. A. C. is built like a real automobile; rides like one, and is one. The motor is powerful and silent and constructed of as good material as you will find in any high price machine.

Deliveries are now being made. Agents handling the C. A. C. are having tremendous sales. Our new factory building enables us to turn out fifteen machines a day.

Read Specifications and Judge for Yourself

MOTOR—2½x4 unit power plant, sliding gear transmission of the selected type; 3 speeds forward and 1 reverse; water-cooled, social seated, left hand drive; center control.

EQUIPMENT—2 gas front lamps; 1 oil rear lamp; tool, jack and pump.

Top, \$15 extra Price, \$425.00 Windshield, \$25 extra

Some territory still open

AGENTS WANTED

WRITE FOR TERMS

COEY MOTOR COMPANY

2008 South Wabash Avenue

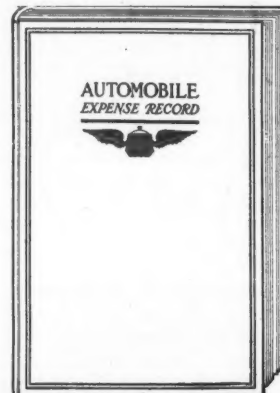
Chicago, Ill., U. S. A.

Cable Code—"COEYMOCO"

Is your car costing too much?

Is your tire mileage too low?

Do you wonder why so much gasoline is necessary?



Are your repair bills high?

Do you know what your gross cost per mile is?

Do you wish to run your car as you do your business?

THE AUTOMOBILE EXPENSE RECORD

solves all these problems quickly and accurately.

With the co-operation of the motorist this record classifies every item of expense—records the miles traveled—shows the mileage yielded by each gallon of fuel and oil and by each tire. It provides a ready means for determining whether gasoline is giving the proper mileage—whether tires are wearing abnormally and finally gives several pages of cost cutting recipes, any one of which should repay, one hundred fold, the cost of this little book and time spent in keeping it.

Do you know when you last used a decarbonizer? You frankly admit that your car may be ruined in a ten mile ride because of lack of lubrication, but how do you keep track of your lubricant? When did you last screw down your grease cups? When did you load up your transmission and differential with lubricant? Time flies—the memory is treacherous. It may seem to you that it was done a week ago when in reality it was a month or more. The AUTO EXPENSE RECORD provides pages on which these things may be carefully recorded that no lapse of memory may ruin your car or decrease its power to serve you well and inexpensively.

Keep a record of expense of every trip, in space reserved for this purpose.

Price \$1.50 Postage prepaid

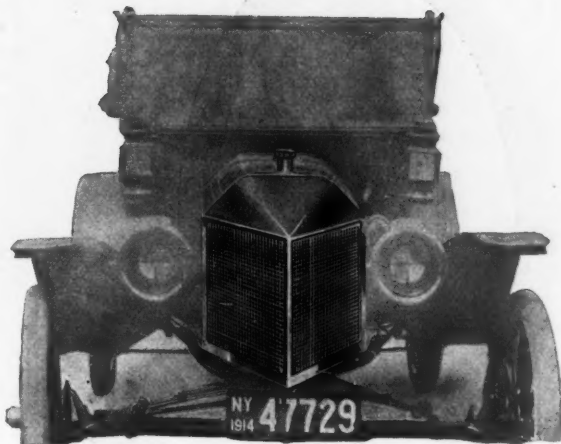
CLASS JOURNAL CO. 910 S. MICHIGAN AVENUE CHICAGO, ILLINOIS

(24)

To Ford Owners:

In addition to the regular straight front radiator which was placed upon the market by the Fedders Manufacturing Company, Inc., a few days ago, we announce herewith the special V-type radiator for Ford cars.

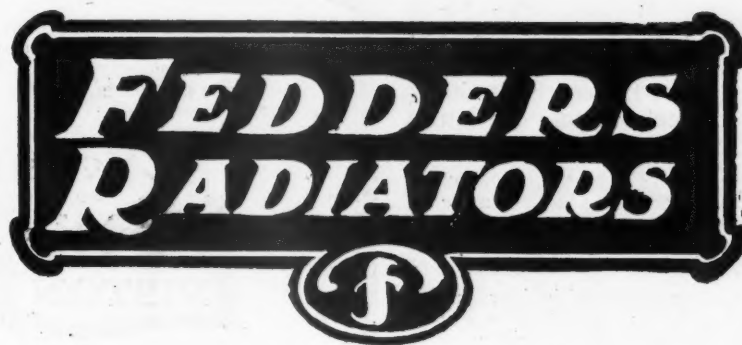
This radiator is of the same Fedders construction and quality as all Fedders products insofar as efficiency is concerned. To those who care to add to the distinctive appearance of the Ford car by the use of a V-shaped radiator we offer this new product at a price of \$45.



This illustration shows the adaptation of the new Fedders V-type Radiator for Ford Cars

The retail price of the straight front Fedders Radiator for Ford Cars is

\$35



The retail price of the V-Type Fedders Radiator for Ford Cars is

\$45

In considering the purchase of a Fedders Radiator specially constructed for Ford cars bear in mind that these radiators are designed solely for the purpose of offering to Ford owners the highest grade, highest quality and most efficient radiator possible to be built.

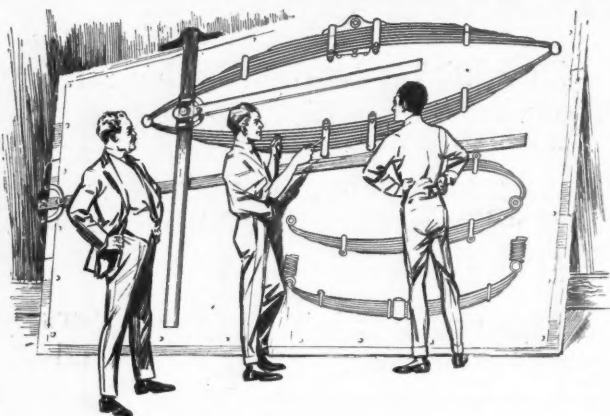
These special Fedders radiators for Ford cars are readily interchangeable with the radiator which comes on the car from the factory, so that the matter of making the change is one of minutes only. Go to your dealer and in all probability he will be able to give you full information concerning these radiators. If he is not able to do so, write to us direct and we will see that your requirements are attended to satisfactorily.

Dealers: Remember that there is a good profit for you in the handling of Fedders Radiators. If you have not already done so, get in touch with us immediately and we will quote you our dealers' discount.

Fedders Manufacturing Co., Inc.
Buffalo Black Rock Station New York



When Writing to Advertisers, Please Mention Motor Age.



Full Elliptic Springs and WHY

Jackson

"No Hill Too Steep
No Sand Too Deep"

Full elliptic springs both in front and in rear have been distinctive features of the Jackson Car for many years. And, for as many years, Jackson Cars have been known as the most comfortable cars on the road.

With a view of securing perfect riding ease, Jackson engineers conducted a series of experiments to determine the best type of spring suspension. They found that the full elliptic spring had from 33½ to 100 per cent more flexibility than the other types.

They found that a Jackson car fitted with four full elliptic springs, designed in correct proportion to the wheel base and weight of the car—would carry its passengers without the slightest discomfort over roads and at speed that have formerly been considered impossible.

They found that in practical service a car fitted with four full elliptic springs could be driven faster over a given road than with springs of a less resilient type. They found that, with a given load, tires gave more mileage on cars fitted with four full elliptics than with springs of other kinds.

They found that the full elliptic springs were practically immune against breakage—a conclusion that has been proved by our subsequent experience. In the seven years we have been using them, replacement for breakage has been almost unknown.

The conclusions which were reached by our engineers have been backed up by seven years' experience in the hands of Jackson owners. It is their verdict which has established the reputation of the Jackson as the easiest riding car at any price.

**Ride in a Jackson and
know real road comfort**

Three models, "Olympic Forty," \$1385; "Majestic Big Four," \$1885; and "Sultanic Six," \$2150. Full equipment, including electric cranking and lighting

Jackson Dealers Prosper

JACKSON AUTOMOBILE CO.
1207 E. Main St., Jackson, Mich.



U.S. and
Foreign
Patents
Applied for

SPEED UP!

If your car "lags"—loiters on hills—stalls in the mud and sand—and takes the dust of cars with little over half its horsepower, your compression is poor and your piston rings are leaking. What you need to speed up is a complete set of—

**McCadden
Leak-Less
PISTON RINGS**

Take your car to your repairman. Tell him to equip it with McCADDEN Rings. If they don't give perfect compression, increase your power, decrease your fuel bills and lessen carbonization—send them back to us and we will refund their full purchase price.

**SATISFACTION GUARANTEED
OR MONEY REFUNDED**

Take pride in your car's power! Write for prices and descriptive literature today.

**McCadden Rings are Flexible
—Self-Adjusting**

Note the perfect joint. Gas cannot escape past the lap; it cannot go under because of the inner ring. McCADDEN Piston Rings hug the cylinder—conform to its contour. No matter how much the cylinder may wear the leakless joint of the McCADDEN Ring is not affected. The McCADDEN Ring is a concentric 2-piece ring made of specially processed gray iron. The inner or expanding ring presses the face of the outer ring flush against the cylinder walls. The McCADDEN Ring reduces tremendously the friction caused by old style rings, thereby making for greater speed and less cylinder wear. McCADDEN Rings are pinned in such a fashion that the pin is concealed and cannot possibly work out. These rings can be quickly attached by any one by simply snapping them over the piston with thumb and finger. U. S. and foreign patents applied for.

Full Descriptive Literature
on Request

DEALERS AND JOBBERS: Here is a guaranteed quality ring at a reasonable price. Write for generous sales proposition.

McCadden Machine Works
St. Cloud, Minnesota

You Never Worry

about pumping up your tires at a garage for most of them have, as part of their equipment, compressed air on tap.

But how can you be sure you won't have to labor and strain over a hand pump if you get a puncture or a blow-out on the road? THE MANZEL ENGINE DRIVEN TIRE PUMP is the logical equipment for your car for it utilizes power from your motor to inflate your tires.

MANZEL

ENGINE DRIVEN TIRE PUMP

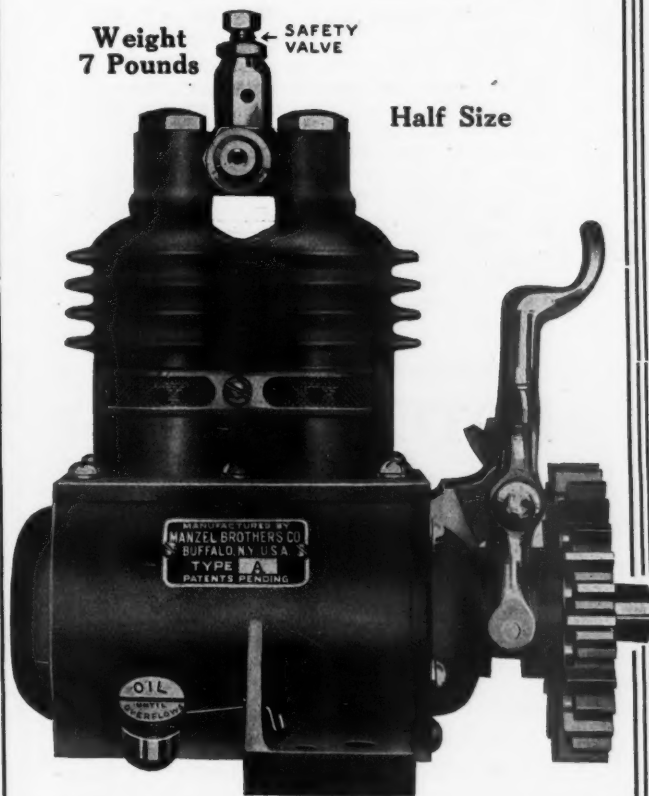
To remove the last obstacle of equipping cars now in use with THE MANZEL ENGINE DRIVEN TIRE PUMP, we carry fittings in stock that make THE MANZEL ready for immediate attachment to Abbott-Detroit, Buick, Cadillac, Cole, Cartercar, Chalmers, Hudson, Howard, KisselKar, Maxwell, Mitchell, Oakland, Overland, Packard, Paige-Detroit, Reo, Speedwell, Studebaker, Stutz and other cars.

MANZEL BROS. COMPANY
306 Babcock Street BUFFALO, N. Y.

Weight
7 Pounds

SAFETY
VALVE

Half Size



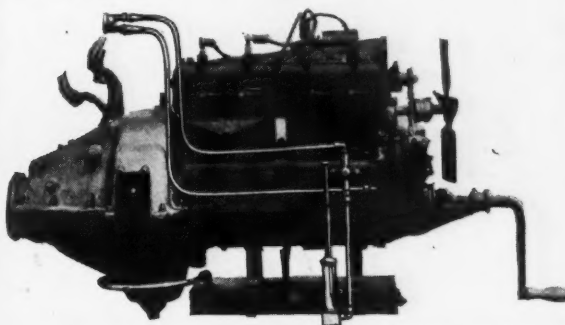
Ford Motorists!

Have Your Ford As Well Lubricated As The Highest Priced Cars

Cut your oil bills in two! Add to the life of your Ford motor! Get all the power in it out of it by reducing frictional losses to the absolute minimum! Equip your car with a lubricating system that is the equal of those found on the highest-priced cars. Install an economical, simple, trouble-proof

MARTENS FORD LUBRICATOR

A constant level, circulating system. Enables you to run from 250 to 300 miles without replenishing your oil. It soon pays for itself in the oil bills it saves you—not to mention increased motor efficiency. Nothing here to wear out. No complicated mechanism to cause trouble or expense. Does not interfere with regular Ford oiling system. Simple to install—you or your garageman can readily attach it.



Cut Showing a Martens Lubricator Installed on 1913 Model T Ford Motor

The sight-feed on the dash tells if the oil is circulating; a gauge on the reservoir tells how much oil you have in reserve. The MARTENS Lubricator insures less carbon deposits, less valve grinding, smoother cylinders and pistons. Insures the same amount of oil to all cylinders and bearings. Get one of these money-savers for your FORD today.

Price with full instructions for installing—complete \$15.00

Through Your Dealer or Direct on Receipt of Price.

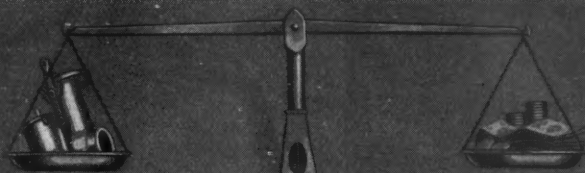
Guaranteed Satisfactory or Your Money Refunded

MARTENS Ford Lubricator is guaranteed to give you the most lubrication at the least expense for oil for the life of your car. Put a MARTENS on your Ford. Try it for 15 days. If, at the end of that time, you are not convinced that it will do all that we claim for it, take it off and return it to us at our expense. The trial will not have cost you one penny.

Energetic Agents and Dealers Wanted Everywhere

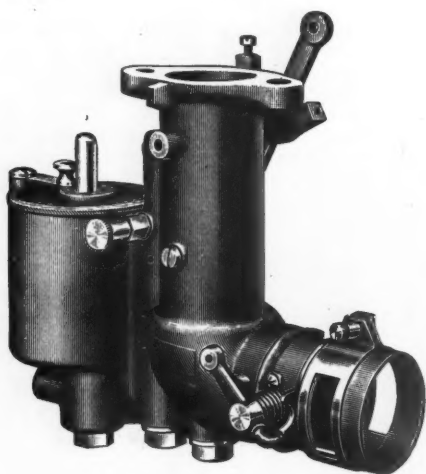
MANUFACTURED BY
THE E. A. MARTENS CO.
Lafayette, Indiana





PRICE

Weighed in the balance of cost and service the Zenith Carburetor is low in price. Built with finest accuracy and tested by special machines which reveal the slightest variations, this famous device of Baverey's invention is like all products of quality—far cheaper in the long run.



Where Simplicity Means Precision The Zenith must be made with mathematical exactness. It has no springs, no valves, no cams, yet its very simplicity requires the utmost precision. No compromises are possible in work like this—"Go" or "No Go" is positive and final.

The Price of Quality Operations so delicate that jewelers' lathes must be employed, careful tests under actual conditions and inspectors hovering over each operation is the Zenith price of Quality. Through these refinements of manufacture the Zenith, with its compound nozzle, gives day in and day out its remarkable results. And that alone is what counts. Send for the Zenith story—just published.



When Writing to Advertisers, Please Mention Motor Age.



The Luxury of Life at the Hotel McAlpin

WITHOUT undue expense, the luxuries of the Hotel McAlpin will give you a brand new conception of modern hotel comforts.

The exquisite Louis Seize restaurant—Turkish, Russian and Hydro-Therapeutic Baths—Women's Floor—Men's Lounge with Buffet, Stenographic and Ticker Service—Roof Garden—Banquet Halls to the number of eight—these are only a few of the sumptuous features of the largest and safest hotel in the world.

Ideally situated at Broadway and 34th Street—with the Pennsylvania Terminal and the Grand Central Station a short distance away—with theatres, shops and great department stores at its very doors, and car lines reaching everywhere, the Hotel McAlpin is admirably convenient both for travelers and people socially prominent in the city's life.

If you enjoy daintily appointed rooms and rarely flavored food, stay at the McAlpin when you come to New York. Its tariffs are notable for their moderation.

Management of MERRY & BOOMER

HOTEL McALPIN

Herald Square

NEW YORK

Nearer than Anything to Everything



Will You Fill Orders

We want a live dealer in every city to fill orders on E. Z. Rider Shock Absorbers. It's a big live business for big live dealers. We are going direct to Ford Car Owners and telling them about E. Z. Rider Shock Absorbers—showing them the advantages—showing them what E. Z. Rider saves—we are selling them.

E. Z. Rider Shock Absorbers

Now we want you to fill orders. Do you want this business?

It will pay you well

We don't want to sell E. Z. Riders by mail. We want to sell them through *you, Mr. Dealer*. Every order you fill will give you a good profit. Men who are alive to the volume of this business to Ford owners will jump at this opportunity.

We Guarantee E. Z. You take no chance

Every set of E. Z. Rider Shock Absorbers carries our rigid guaranty of "Satisfaction or money back."

You can put E. Z. out on ten days' trial and if any user is not perfectly satisfied, we'll refund the money. That broad policy ought to win, hadn't it? You take no chance when you handle E. Z. Rider Shock Absorbers.

1 Owner in 3 Wants E. Z.

Every Ford owner will want E. Z. Rider when he learns what they save him and his Ford.

E. Z. Rider gives the Ford that Big Car Riding Luxury that all Americans want. They save all the jolt, jar, vibration and irritation of rough roads—save car upkeep expense, engine trouble and save tires. No Ford owner will drive without E. Z. Rider once they know the advantages. When you consider that 1 car in every 3 is a Ford, think what this business means to you.

Popular Price

\$15 set for four (front and rear)

E. Z. Rider is of the finest quality in material and workmanship; and guaranteed in every way, and yet cost the Ford Owner only \$15 for set of four, f.o.b. Cleveland. E. Z. Rider is a popular priced shock absorber, and it's bound to be a big seller.

Be ready to fill orders

If you are alive to this E. Z. Rider business write for our special Dealers' proposition. Now—today—and be ready to fill orders.

**The Forest
City Electric
Company**

5014 Windsor Ave.
CLEVELAND, O.



It adds to pleasure

It eliminates worry

It saves time

It cuts expense

What car equipment you now have will do more than that?

The 1914 Edition of the

AUTOMOBILE BLUE BOOK

ought to be with you on your next motor trip. It is as essential to pleasure, time-saving and economy as an extra tire or tire pump.

Detailed Road Maps

Accurate Running Directions

Descriptive Talks of Each
Section

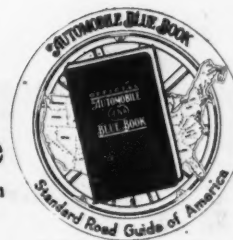
\$2.50 Per Volume

Obtainable at any leading book shop, auto supply house or garage, department store, hotel news stand—or sent direct, express prepaid.

LOOK OVER THE NEW EDITION

**The Auto-
mobile Blue**

910 S. Michigan
Ave., Chicago



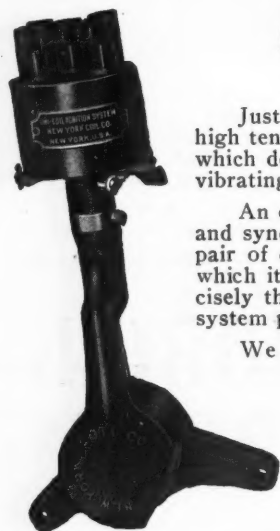
**Book Pub-
lishing Co.**

2160 Broadway,
New York City

Important Announcement

What all Ford Owners Have Been Waiting For—The Uni-Coil Ignition System for Ford Cars. Operated by the Ford Fly Wheel Magneto or Battery at the Remarkably Low Price of

\$15.00 Complete



Just consider what this means to you—an ignition system fully equal in workmanship to the best high tension magneto especially designed to operate on the Ford fly wheel magneto or battery current, which does away with your inaccessible timer and the impossible problem of perfectly adjusting four vibrating coils.

An elevating gear bracket carries our special device, which is a combination of timer, distributor, and synchronizer. It contains a circuit operating mechanism of extreme simplicity, which causes one pair of contacts to time or synchronize the magneto or battery current to a single coil unit from which it is delivered by means of the high tension distributor direct to the four spark plugs, in precisely the same manner as a magneto; in short, the most satisfactory, long lasting and best adapted system possible to secure for a Ford car.

We furnish the outfit complete; you do not have to drill a hole or even furnish a screw.

This is your opportunity to equip your car with a high grade, dependable ignition system made and guaranteed by a thoroughly reliable firm of long experience.

Do not forget that we manufacture the famous Model "T" and Senior Master Vibrators; also the "NYCO" Accelerator (with foot pedal or steering post control) and the "NYCO" Two System Switch.

New York Coil Company, 338 Pearl St., New York, N.Y.

WESTERN BRANCH, 1429 Michigan Ave., Chicago, Ill.

THE ORIGINAL NEW DEPARTURE was laughed at by those who now aim to duplicate it

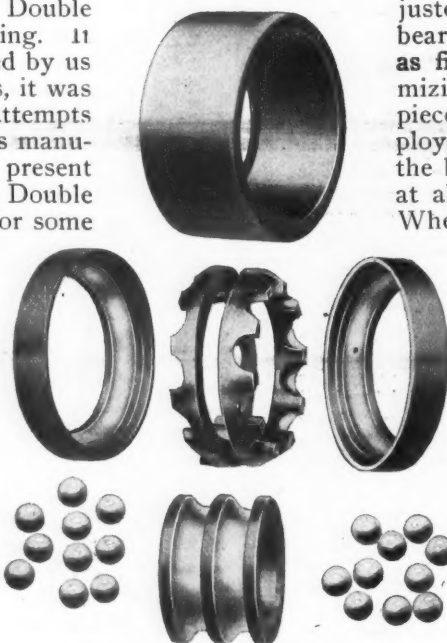
We are the originators of the Double Row radial and thrust ball bearing. It was the first bearing manufactured by us and, like all radical improvements, it was skeptically received at first, but attempts are now being made by numerous manufacturers to duplicate it. The present design of the New Departure Double Row has been in successful use for some years and its predominating features have been proved in actual service. These features are:

Greater radial load carrying capacity than any other bearing of any type.

Ability to resist severe and thrust stresses from any direction.

Ability to take both radial and thrust loads at the same moment without friction.

The combination in a single self contained, permanently ad-



justed, unit of a radial and thrust bearing successfully replacing as many as five bearing units, thereby economizing space and expense. A two-piece frictionless separator is employed, assuring proper alignment of the balls in their true path of rotation at all times.

When one row of balls rotates faster than the other, as sometimes occurs in double row bearings, the New Departure ball spacing system prevents cramping and distortion of the separator, which eventually results in breakage, disalignment, and destruction of the bearing.

New Departures are guaranteed for quality of materials and accuracy of manufacture and finish.

Catalog of New Departure Double Row, Single Row and Radax Ball Bearings on request.

THE NEW DEPARTURE MANUFACTURING COMPANY

Western Branch, 1016-17 Ford Bldg., Detroit, Mich.

BRISTOL, CONN.

DEALERS WANTED

To handle the

Leasure Sanitary Eye and Nose Shield

The only Shield on the market for autoists and motorcyclists with positive sanitary **nose** protection from dust. Perfectly transparent. Gives wearer full vision. Weighs but half an ounce. Cannot break and injure Eyes. Can be worn over spectacles. Oculists and doctors recommend them.



**DON'T WEAR
BLINDERS
LIKE A HORSE**

Retails at.....\$1.00

Put up in neat leather case

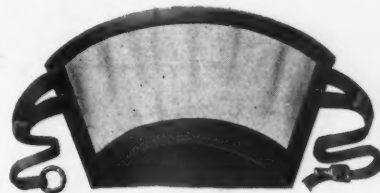
MADE IN 4 COLORS

Sells On Sight

← **NOT MADE OF GLASS
IT'S FLEXIBLE**

Thousands being sold

The Leasure



PERFECT PROTECTION

Write for prices

Sanitary Sales Company, Inc.
East End Trust Building, Pittsburgh, Pa.

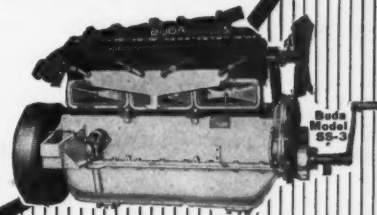
BUDA MOTOR

The Part That Sells The Car

As the Automobile becomes an "old story" the buyers' knowledge of its mechanism increases. Today the average buyer of a motor vehicle is more or less an expert. He may be particular about the body and trimmings, but he also insists on being shown the "works." It is partly because of this, and partly because manufacturers are gladly recognizing proven merit, that the demand for the BUDA MOTOR grows and grows and grows and grows.

The Unequalled Buda Six

is being adopted by the manufacturers of some famous fours who are now adding the six to their lines, because The Buda Six, Models "SS-3" and "SS-U" have *no superiors* in the whole automobile field, no matter what the price. Both scientific and practical tests will prove this for any interested manufacturer.



THE BUDA COMPANY

FACTORY, HARVEY, ILL., (Chicago Suburb) Address
BRANDENBURG & COMPANY, 1108 S. MICHIGAN AVENUE, CHICAGO
57th and Broadway, New York Ford Building, Detroit

When Writing to Advertisers, Please Mention Motor Age.

Solve Your Night Riding Problem

Ford drivers, stop monkeying with gas that may go out any minute and land you in a ditch.

Stop lighting from magneto that gives you dim lights at low engine speed and always puts a double task on the magneto.

Stop using ordinary storage batteries which put your car out of commission during the too frequent 12-hour charging period.

There's only one real solution. That's

**NEWOLITE
SYSTEMS**

Price \$40 Complete

Consists of high grade ball bearing dynamo, automatic cutout, 6-volt storage battery, battery box with lock, two black and nickel bullet head lights with globes, tail light with globe, adaptors with globes for side lamps, switch, transmission and necessary wiring. A complete plant. Dynamo will fill any 6-volt battery. Quotation upon any part furnished on request.

Write for Literature—Dealers Wanted

If you drive a Ford, Velie, Metz, Hupp, or any small car, write at once for literature and name of dealer in your town.

New Lite Mfg. Co., 2100 New Lite Bldg., Newton, Iowa



A Car of Greater Worth Than \$1195 Would Ever Before Buy

Westinghouse Electric Starting System
Westinghouse Electric Lighting System
Motor Driven Tire Pump
Unit Power Plant
Long Stroke Motor

Left Side Drive

Equipment

Stream Line Body—Concealed Hinges
Enclosed Valves

Center Control Levers

Gasoline Tank under Cowl Dash
Demountable Rims
Floating Rear Axle with Pressed Steel Housing
Goodyear No-Rim-Cut Oversize Tires
114 Inch Wheel Base

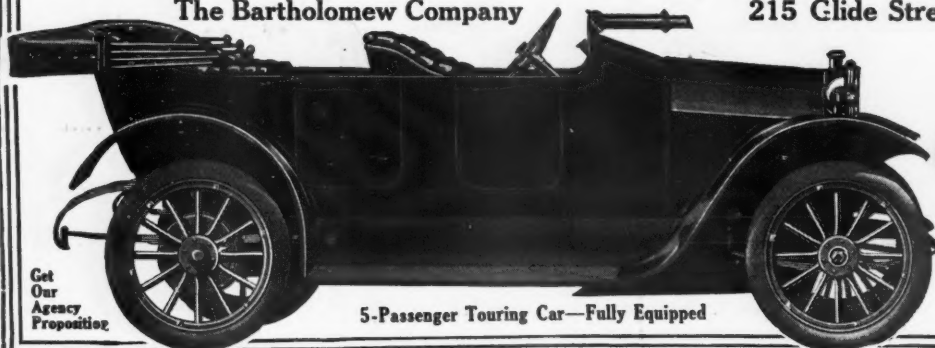
In all the 31 years of its existence, the company behind this Model 30 has never been "re-organized." It is a *stable* Company. Since 1882 it has stood for the highest standards of manufacture. Its automobile product is just as substantial as its business policy—which has always been to give *more* than the price asked demands.

The Model 30 is a car of maximum value

The Bartholomew Company

at a minimum figure. Factory equipment and efficiency have enabled us to reduce production cost—and the individual buyer *profits* thereby. In appearance—equipment—construction—from *every* standpoint of car excellence this Model 30 is a *good* car at a *low price*. Dealers will do well to learn more about this \$1195 automobile—also about our Model 36, selling at \$1840. *Please write for catalogs.*

215 Glide Street, Peoria, Illinois



Get
Our
Agency
Proposition

5-Passenger Touring Car—Fully Equipped

Glide


Model 30

When Writing to Advertisers, Please Mention Motor Age.

The Price of **GABRIEL'S SNUBBERS** is

\$15, \$20, \$25
Per Set of Four
Half That Per Pair

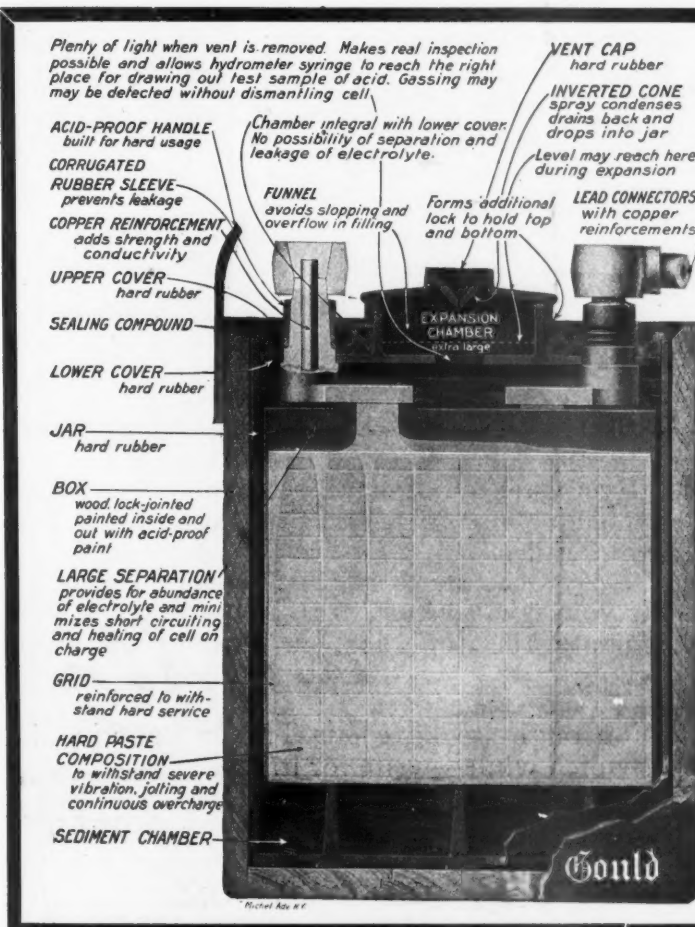
As easy to attach as a pair of lamps



Standard Factory Equipment on White, Stearns, Peerless, Oldsmobile, and Lozier. Partial or special equipment on over 20 other leaders.

Ask the Engineering Department of Your Car
Booklet and prices sent on request.

Gabriel Horn Mfg. Co., 1415 E. 40th St., Cleveland, Ohio



Plenty of light when vent is removed. Makes real inspection possible and allows hydrometer syringe to reach the right place for drawing out test sample of acid. Gassing may be detected without dismantling cell.

ACID-PROOF HANDLE—built for hard usage

CORRUGATED RUBBER SLEEVE—prevents leakage

COPPER REINFORCEMENT—adds strength and conductivity

UPPER COVER—hard rubber

SEALING COMPOUND

LOWER COVER—hard rubber

JAR—hard rubber

BOX—wood, lock-jointed painted inside and out with acid-proof paint

LARGE SEPARATION—provides for abundance of electrolyte and minimizes short circuiting and heating of cell on charge

GRID—reinforced to withstand hard service

HARD PASTE COMPOSITION—to withstand severe vibration, jolting and continuous overcharge

SEDIMENT CHAMBER

VENT CAP—hard rubber

INVERTED CONE—spray condenses drains back and drops into jar

Level may reach here during expansion

LEAD CONNECTORS—with copper reinforcements

EXPANSION CHAMBER—extra large

FUNNEL—avoids slopping and overflow in filling

Chamber integral with lower cover. No possibility of separation and leakage of electrolyte.

Forms additional lock to hold top and bottom

Gould

Gould Lighting, Starting and Ignition Battery

1915 Type for 1915 Cars

Discriminating owners are going to specify this battery for their 1915 cars and owners of older cars can use it advantageously in keeping up-to-date.

Any experienced battery man can tell you that Gould batteries are distinctly superior and that the new design shown embodies many desirable features not obtainable elsewhere.

Our designers have exercised their usual originality and good judgment in perfecting the design for severest service. You owe it to yourself to investigate. Bulletins, prices, etc., sent on request.

Gould Storage Battery Co.

General Offices: 30 E. 42d St.,
New York City

Works:
Depew, New York

Boston—14-16 Cambria St.
Philadelphia—613 Betz Bldg.
Cleveland—1761-5 E. 18th St.
Detroit—88 E. Congress St.

Chicago—The Rookery
San Francisco—1440 Van Ness Ave.
Los Angeles—110 E. Pico St.

Agents in
Washington, Rochester, Buffalo, Pittsburgh, Milwaukee, Minneapolis, St. Louis, Kansas City, Omaha, Denver, Topeka, Seattle

CANADIAN REPRESENTATIVE:
R. E. T. Pringle, Toronto, Montreal, Winnipeg, Vancouver

Full stock of parts, plates and repairs carried by all offices and agents.

(103)

NO
MAN
IS
RICH
ENOUGH

to afford
a cheap
Plug in
his motor.
A poor
spark
requires
a richer
mixture
and more
gasoline.
Cheap
Plugs,
with their
cracking
Porcelains
or oil-
soaked
mica, lose
half the
current.



MILLIONS
ARE
SPENT
TO
ADVERTISE
PLUGS

The
millions
of de-
lighted
users
of the
HERZ
PLUG
are our
adver-
tisement

Buy HERZ PLUGS

They will prove the best investment of
your life, one that will bear rich interest in

Smaller Gasoline Bills

ASK YOUR DEALER

HERZ & CO., 245 W. 55th Street (Just off Broadway.) New York

FORD Something BETTER



USE PEDERSON "UNITED" TERMINALS

on your Ford. The greatest improvement you can
make. Only 50c by mail, postpaid. Oil your Ford
from the seat. The Pederson Sight Feed Lubri-
cation does it. We also manufacture for Ford
cars the Handy Gasoline Turn-Off and the Stay-
On Belt Holder.

Write today for our new Catalog just off the press

Pederson Lubricator Co., 638 First Ave., New York, N. Y.

KOEHLER
KOEHLER

KOEHLER ONE TON TRUCK \$750

GREATEST VALUE AT THE PRICE • LOWEST PRICE IN CAPACITY

Here are brief specifications:
MOTOR, 24 h.p., wa-
ter-cooled, 4-cycle;
IGNITION, high ten-
sion magneto; TIRES,
30-inch, standard re-
movable; TREAD, 63
inches; AXLES, 2-inch
square rear, 1 1/2-inch
front; TRANSMIS-
SION proved RIGHT
by years of use Gears,
genuine chrome-nickel.

TEN BODY TYPES

KOEHLER \$750

ONE TON TRUCK

SEND FOR CATALOGUE

THE DOMINATING TRUCK OF THE ONE TON FIELD

Mr. Dealer: How about your city or town—is it Koehlerized or is it ready for someone to reap a harvest? If the latter, will it be you or one of your competitors? Whoever handles this truck makes it hard for competitors to sell ANY other truck.

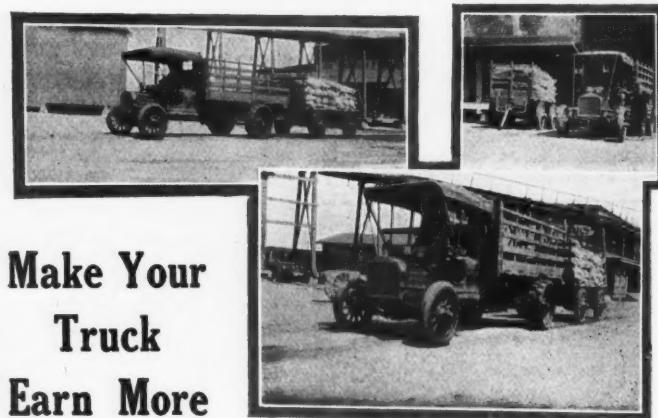
This is a great money maker for dealers because it is the lowest priced ton truck in the market, the greatest value at any price, has the greatest adaptability to all lines of business, is simple in construction, and does its work in a highly efficient and economical manner. It makes money for the dealer because he can show any merchant that it will save money for him.

DEALERS Do not let another week go by without sending for our proposition, and the most complete motor truck catalog, through and through, you ever saw. This catalog and our complete selling plan should be in YOUR hands.

H. J. KOEHLER S. G. CO., 1709 Broadway, New York

KOEHLER ONE TON TRUCK \$750

KOEHLER
KOEHLER



Make Your Truck Earn More

If you have a long haul, you can deliver twice
as much or more material per trip by using the
Troy Trailer.

If you have a short haul, Troy Trailers will
eliminate the time lost in loading and un-
loading.

You ought to have our Trailer Bulletin M.
It's worth while—write for it.

The Troy Wagon Works Company
Clay Street
Troy, Miami County, Ohio



"Now You're Coming"

BASLINE Autowline is the biggest little thing a motorist ever carried in his car. Only $4\frac{1}{2}$ pounds weight, $\frac{1}{4}$ -inch in diameter and 25 feet long—but "Oh, my!" Basline Autowline pulls a mired-down car to solid ground, or takes a cripple home in fine shape. 4,000 pounds dead weight and a 20% grade can't bluff

Basline Autowline

"The Little Steel Rope With the Big Pull"

This necessary Automobile Accessory is same quality steel wire rope as "Yellow Strand," the famous rope that's doing many of the world's big erecting and contracting jobs. All accessory dealers carry it. Price, east of Rocky Mountains, \$3.95.

Get an Autowline today before the inevitable happens. Be ready to tow or be towed.

FREE Write for illustrated circular showing uses of Basline Autowline

Broderick & Bascom Rope Co.
813 North 2d Street, ST. LOUIS, MO.
NEW YORK OFFICE, 76 E. Warren St.
Manufacturers of famous Yellow Strand Wire Rope that made great records at Panama



Add 7 Feet of Sensitive Spring Length to Each of Your Ford's Springs

The large diameter spiral springs in the F-F Shock Absorber actually add 7 ft. of very sensitive spring length to each spring of your Ford car. Consider what this will mean to the riding qualities of your car when added to and working in harmony with the regular springs.

France-Ford Shock Absorber

All wearing parts are fitted with bronze bushings. F-F Absorbers are built to last as long as your car. They offer no objectionable features such as friction plates, slots or joints to clog with mud, bind, wear, rattle or squeak. No working parts are exposed. They are automatically oiled. Anyone can quickly install F-F Absorbers.

Guaranteed Satisfactory or Your Money Refunded

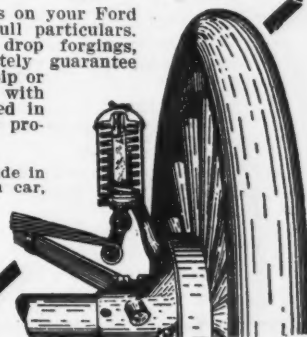
You can try a set of F-F Absorbers on your Ford car for 30 days. Write us for full particulars. Made throughout with one-piece drop forgings, we are in a position to absolutely guarantee against imperfections of workmanship or material. Each set is die stamped with a serial number, which is registered in our Service Department, for your protection.

PRICE \$15.00

For set of four, front and rear. Made in four types; runabout, touring, town car, delivery car. When ordering, specify type wanted.

Ford Accessory Dealers Wanted Everywhere

FRANCE MFG. COMPANY
1434 West Seventh Street
CLEVELAND, OHIO



Starting - Lighting - Ignition

REMY

Apparatus & Organization of Constant Service

A FACT!
Equipment and Service Gives
Motor Cars Their

REPUTATION

REMY

"Standard of the World"

Starting - Lighting - Ignition

A Service Station in Every Motorina Center.

REMY ELECTRIC COMPANY

Laboratories-Factories-General Offices

Anderson Indiana

BRANCHES

New York

Detroit

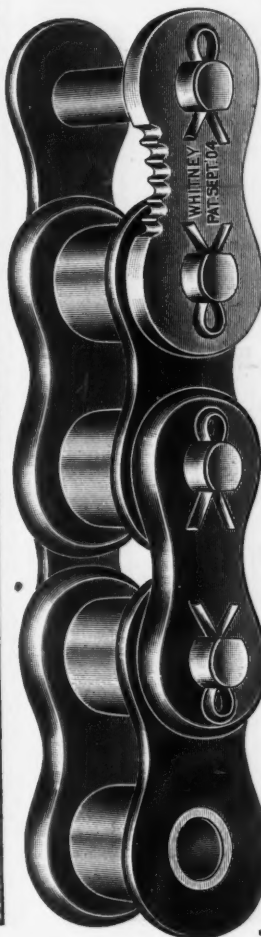
Kansas City

Minneapolis

Boston

Chicago

San Francisco



"Whitney" Chains

Are used by the Leaders

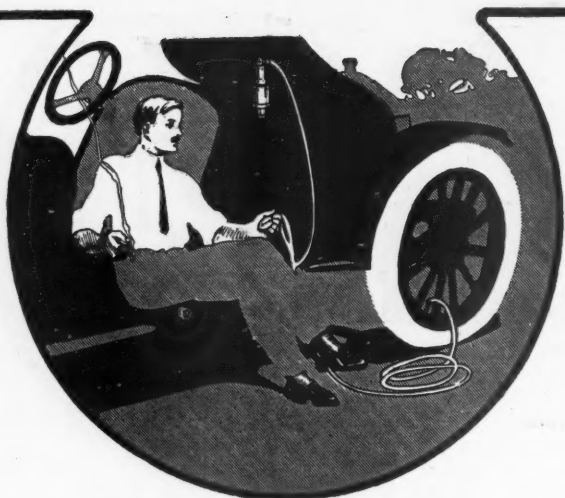
They have been the recognized leaders for years and are the most practical chains built for commercial vehicles.

We have completed a large addition to our factory, making it the most modern and complete factory of its kind in the country, and are now in position to fill orders promptly.

Insist on "Whitney" Chains when making replacements.

"Whitney" Chains
Are Built for Strains

The Whitney Mfg. Co.
Hartford, Conn.



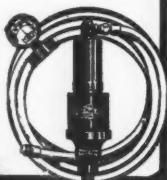
MAYO SPARK PLUG PUMP

Adaptable to all size cars. Instantly attached by substituting for any spark plug. MAYO Quick Detachable Spark Plug may be used if desired. Pumps pure, fresh air only. Inflates largest tire in from 3 to 4 minutes. Built with metal rings like a motor and will last as long. Weight 2½ lbs. An occasional drop of oil the only attention it requires.

Price complete with pressure gauge, 12 ft. hose, all connections, \$10. Quick Detachable Spark Plug \$1.50 extra.

Try One Free on Your Car for 30 Days. Write us.

MAYO MFG. CO.
55 E. 18th St. CHICAGO



Does Your Engine Overheat?



Makes a Cooling System be Good

OVERHEATED ENGINES RESULT FROM THE FAULTY OPERATION of the cooling system. In water cooled cars, the most common cause is "scale."

OVERHEATING CAUSES CARBON DEPOSITS and the carbon increases the overheating. The final result is either a bill for repairs or for removing the carbon or for both.

KEEP YOUR COOLING SYSTEM WORKING PROPERLY—keep "scale" out of it—and you will never have any serious trouble with your engine.

RADIATOL REMOVES AND PREVENTS "SCALE" in all water cooled cars. It makes cooling systems work properly. It prevents radiator leaks.

TRY RADIATOL—IF IT DOES NOT DO AS WE SAY, you'll get your money back on your say so.

RADIATOL IS SOLD BY AUTO SUPPLY DEALERS, or we will send a trial package by parcel post, prepaid on receipt of \$1.00

Wills Chemical Co.

Dept. D. Wheeling, W. Va.

A Reliable Electrical Measuring Instrument Indicates Quality



Weston Model 267 Dashboard Ammeter

WESTON AMMETERS

for control of Electric Lighting and Self-Starting Systems are the most reliable, durable and highest grade instruments made for this purpose

Please send for our 30-page bulletin No. 8 describing them

Weston Electrical Instrument Co.
NEWARK, N. J.

New York	Boston	Denver	Birmingham	Montreal
Philadelphia	San Francisco	Cleveland	Toronto	Paris
Chicago	St. Louis	Detroit	London	Berlin

How You Can Help



"A continuous, improved highway from the Atlantic to the Pacific"

Do you want to be one of that great army of progressive patriots who are helping to build a greater, more beautiful and more prosperous America?

Do you want to join with a million other practical dreamers, in the pushing through of an unselfish work which means more business, more pleasure, more education and more advantages to all?

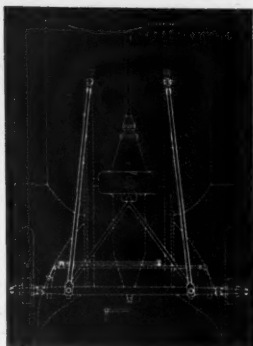
Do you want to help in the building of an eternal monument to the greatest name in the history of our country, to the greatest man the nineteenth century produced—Abraham Lincoln? If you do, join the Lincoln Highway Association.

It's a great organization—a grand work to feel in sympathy with—costs but \$5.00, payable **once**. Get out your check book **now**—here's a chance for you to build a portion of an eternal monument, the longest improved road in the world.

Send the five to

The Lincoln Highway Association
Dime Bank Bldg., Detroit, Mich.

We have a set of Lincoln Highway pennants for your car, which will come to you for a dollar, prepaid. All the real Lincoln Highway boosters are wearing a little red, white and blue lapel button—they're twenty-five cents. Wear one.



MONNICH SAFETY RADIUS ROD AND FRONT AXLE SUPPORT FOR FORD CARS

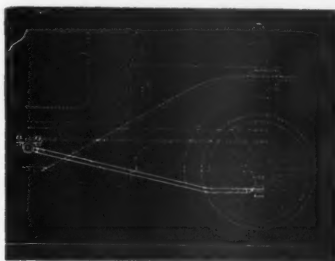
The only device obtainable that supports and braces the Ford front axle directly to the car frame.

Absolutely prevents all danger from broken or bent radius rods. Takes all strain and road shock from crank case. Prevents loosening of rivets and leakage of oil caused by loose rivets on the crank case hangers. Prevents steering gear from locking when making short turns. Makes the Ford car steer better and makes driving much safer. Stiffens entire front axle and steering connections. No Ford car can afford to be without it. A necessity, not a luxury.

Made of 1" drawn, seamless steel tubing with 3-16" walls, drop forged ends and connections. Made substantial and durable enough to outlast any Ford car it is put on. Simple and absolutely dependable. Easily attached. Write for full particulars.

Guaranteed Satisfactory or Your Money Refunded. Order through your dealer or Direct.

BERNARD MONNICH
Hooper, Nebraska
Dealers and Jobbers wanted everywhere



You cannot run your car with any old air pressure in the tires and expect the tires to last.

Tires are built to withstand a definite and specified air pressure.

You can only get maximum service when you inflate them to the exact air pressure needed, and maintain that specific pressure at all times.

SCHRADER



ONE DOLLAR
invested in the purchase of a
**SCHRADER UNIVERSAL
TIRE PRESSURE GAUGE**
will save you hundreds of
dollars for new tires.

For Sale by Tire Mfgs., Jobbers, Dealers, Garages or
A. SCHRADER'S SON, Inc.
783-791 Atlantic Ave. Brooklyn, N. Y.

The New V-Ray FORD Spark Plug



In Porcelain Only

Price \$1⁰⁰

Another V-Ray triumph, the new Ford Spark Plug, a positively guaranteed wrench proof plug that will outlast your car. Note in the accompanying illustration that the wrench hexagon portion of the steel shell extends up and away from the motor's countersink, thus rendering the plug

Absolutely Wrench Proof

This construction makes it impossible for the spring of the wrench to cause any damage to the plug. All the other well known qualities of the V-Ray plugs are incorporated in the manufacture of the new Ford type. It is impervious to oil or heat conditions and is sold with a guarantee to give

More Power on Less Gas

Remember, the new Ford plug when you buy again, and you will never use any other.

Sold With a Guarantee by All
Jobbers and all Dealers.

THE V-RAY COMPANY
Marshalltown Iowa



The AERMORE Exhaust Horn

"A gentleman is coming." That's the thought called forth by the harmonious and commanding melody of the Aermore Exhaust Horn.

It has four perfectly blended notes that can be modulated from a low musical chime to a crashing burst of harmony that cuts through traffic sounds like a hot knife through butter, and always gains response and respect.



It does not clog, and has no movable parts to get out of order. An Aermore will give you a satisfactory signal for the life of your car without one cent of expense for upkeep.

The prices range from \$5.50 to \$10.00. Made to fit all cars.

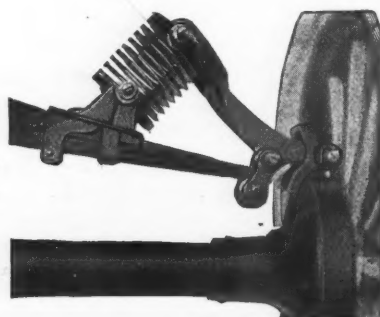
Write for our catalog. We have a free horn proposition for dealers.

The Fulton Company
724-726 National Avenue
MILWAUKEE WISCONSIN



The "Hassler"
FORD
Shock
Absorber

Different from all others, and many times better. Thousands in use. Many Ford dealers are now using the "Hassler" exclusively. Attractive proposition to Special Agents with demonstrating cars in unoccupied territory.



Robert H. Hassler
W. Tenth and Canal Sts.
Indianapolis, Ind.



The Motsinger Carburetor
is Guaranteed to Increase
Your Milage or Your
Money Refunded

Motsinger
Carburetor increased mileage guaranteed

We can show you how to pare your gas bills down to what they should be.

Instruct your repairman to install a MOT-SINGER. If it doesn't increase your mileage, we take it back—refund its full purchase price. You can't lose.

Write us.

Write for interesting literature describing how and why we can guarantee the MOTSINGER to pay for itself.

THE LEVER WEIGHS OUT A JUST RIGHT MIXTURE HERE



Motsinger Device Mfg. Co.

884 Putnam Street

LAFAYETTE, IND.

"WARNER GEARS—STANDARD FOR YEARS"

"It's an absolute impossibility to 'open up' a plant and immediately deliver efficient gear assemblies.

"It takes time and experience—especially experience—to enable a concern to ship really dependable parts.

"This is an undisputable fact, no matter what the business happens to be.

"We are surely capable, in lieu of these facts, as for thirteen years we have been manufacturing automobile gear parts for the most successful and best known motor car manufacturers in the country.

"And listen, what is more, we've been pleasing them in every particular.

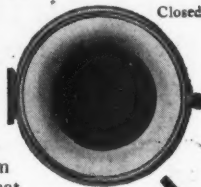
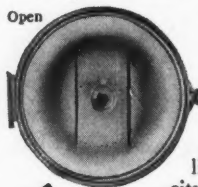
"Is there any better proof of a product's merit than one hundred per cent of satisfied customers?

"Looks as if we ought to be able to please you too."

**WARNER
GEAR
CO.
MUNCIE-IND.**

DETROIT OFFICE - 628 FORD B'L'D'G.

Keep Your Searchlights Lighted in the
City and Fulfill
the Law



This simple electric attachment, controlled by a push button, changes your lamps instantly from full searchlights to perfect broad beam city driving lights without that dazzle which the law forbids.

NODAZ Adds Immeasurably to
the Safety and Comfort
of Driving at Night

An economy—Lessens your risk in city and country—You avoid glass and all other obstacles in the streets. Your local dealer can supply you and equip your lights for double service.

Send post card for Free Folder.

WARD LEONARD ELECTRIC CO., Bronxville, New York

RESILIENT

**Detroit
Springs**

SILENT TRADE MARK SELF-LUBRICATING

Look
to the
Safety
Points

The Springs of a motor car have to do more than carry the weight of car and passengers. They have to take all the shocks of the road at any speed.

Insist upon Detroit Springs that are tested to the extreme possibility of emergency shocks under full load.

Detroit Springs are guaranteed for two years.

Write for our interesting book telling the story of the manufacture and tests of Detroit Springs.

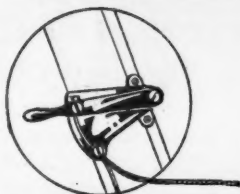
DETROIT STEEL PRODUCTS CO.

2260 E. Grand Blvd.,

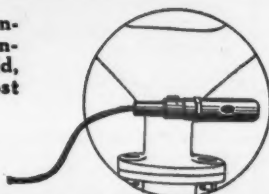
Detroit, Mich.

Also manufacturers of Fenestra Solid Steel Windows

Increase your Mileage 25 to 50% on same gasoline



Handy installed on intake manifold, steering post control.



Guaranteed to give perfect satisfaction.

The Handy Controller and Gasoline Saver increases your gasoline mileage from 20 to 40%—it cuts down your running expenses materially.

95% of the time your motor can run faster and develop more power on a much leaner mixture than it is practical to adjust your carburetor for.

The Handy Controller attached to the intake manifold above the carburetor automatically adjusts the mixture of air and gasoline, giving your motor a much leaner mixture without touching your carburetor adjustments.

Thus no waste fuel—every drop of gasoline is consumed—giving more power and more gasoline mileage with little or no carbon deposits. The Handy is opened and closed by a little lever below the wheel on steering post—at your finger tips. When your car is running it works automatically—needs no attention.

Try one on your own motor for 30 days. If it does not give you perfect satisfaction we will cheerfully refund your money. Have your dealer install one on your car today.

Handy Controller \$7.50—Junior Controller \$5.00.

See your dealer—if he hasn't it write direct, giving dealer's name.

The Cray Company
655 Woodward Ave., Detroit, Mich.
 Chicago, Ill., 718-719 Michigan Blvd.; Kansas City, Mo., 513 New Nelson Bldg.; Los Angeles, Cal., 324 Central Bldg.; New York, N. Y., 128 Maiden Lane; Canadian Distributor, L. W. Fraser & Company, Windsor, Ont.

Acme Torsion Springs



Could we make a stronger guarantee? And notice it is not a mere claim—it is a positive guarantee

WHY? Because ACME TORSION SPRINGS are based on SCIENTIFIC PRINCIPLES, properly applied. ACME TORSION SPRINGS, the only practical device on the market that can act FREE with, and CONTINUOUSLY IN CONJUNCTION with the LEAF SPRINGS, any way they are called upon to work, and adjust themselves MECHANICALLY to all conditions.

We Challenge Contradiction of Our Claims
 Get an Expert's Opinion

Equip your car with ACME TORSION SPRINGS

Insurance for life of occupants, car and easy riding. Don't be fooled by "shock absorbers." What you want is more spring capacity under proper Automatic Control. Acme Torsion Springs add at least 18 feet to the total leaf spring area, every inch adding greater resiliency automatically controlled.

Acme Torsion Springs stop vibration, prevent spring crystallization and breakage, minimize tire and engine trouble, and improve the riding qualities of any car at least 100%. They cost less than half the price of shock absorbers, and are worth several times as much. **Eliminate Vibration and you eliminate trouble.** We have convinced thousands, let us convince you.

N. B.—Acme Torsion Spring Equipment is fully **Guaranteed** against **Defects** and **Breakage** for the life of the car.

Write today for information

Acme Torsion Spring Co.
 994 Boylston St., Boston, Mass.

WARNING!

Acme Torsion Springs are covered by letters of patent, and we have the sole and exclusive right to manufacture, use and sell the same. Take warning that our interests will be protected.

How's This \$7 For

The Brown Jr. Tire Pump Complete With 10 Feet of Woven Air Hose Tested to 500 lbs. Pressure.

If you own a Ford or any other small car, you can't afford to break your back pumping up the tires.

The Brown Jr. will do the work for you more quickly and better than you can do it by hand.

Made of the same materials and on the same mechanical principles as the Brown Impulse Tire Pump, which is making good for more than 60,000 automobilists. Don't forget the price, \$7.00; \$8.50 if you want a Brown Q. D. Spark Plug and connections.

Write us or ask your dealer concerning this latest sensation.

THE BROWN COMPANY
 120 Bellevue Syracuse, N. Y.

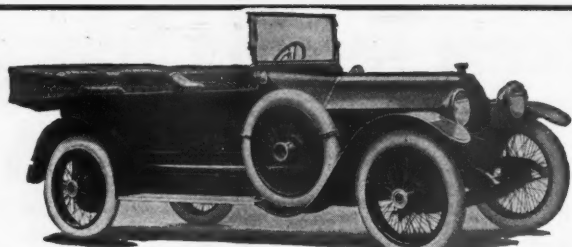
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SPLITDORF MAGNETOS—low and high tension—are made in a wide range of models for all manner of work and they'll give your motor more power—make your motor run smoother and quieter than will any other make, and, equipped with one, you can always start your engine on a quarter turn.

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SPLITDORF ELECTRICAL CO.
 98 Warren Street NEWARK, N. J.



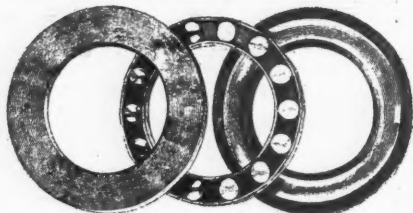
BENHAM SIX

Continental 6 P motor, 48 H. P. Bosch Ignition, Brown-Lipe 4 speed forward transmission, Spicer Universal joints, Timken full floating rear axle, Timken front axle with Empico speedometer drive, Timken bearings throughout, Long radiator, One man top, Gemmer steering gear, Left drive, center control, Goodrich tires, 34 x 4 1/2. Electric starting, generating and lighting, 130-inch wheelbase, 3,600 lbs.

Two pass., \$2485; Five pass., \$2485; Seven pass., \$2535
BENHAM MFG. CO., Detroit, Mich.



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COMPLETE THRUST BEARING

The Star Ball Retainer Co.
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Manufacturers of Radial Ball Retainers, Thrust Ball Retainers, Complete Thrust Bearings

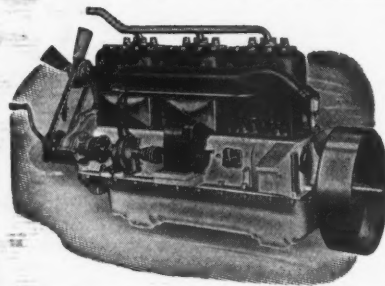
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3 1/2 x 5 1/2 four and six cyl.
 4 1/2 x 5 1/2 four cylinder
 Standard or Unit
 and
 4 x 4 and 4 1/2 x 5 1/2 standard types, all L head, 4 cycle

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 Literature on request.

The Rutenber Motor Company
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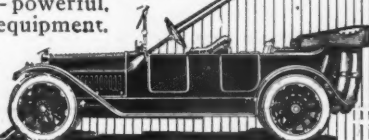
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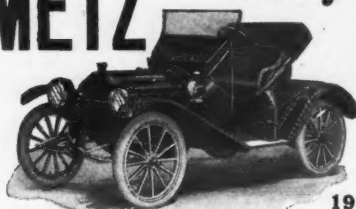
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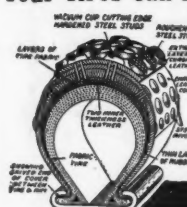
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At last the pneumatic tire problem has been virtually solved—the weak points in previous tire construction have been eliminated. The resiliency of a Bricton Pneumatic Tire puts it in a class by itself. It is Puncture-proof—Blowout-proof—Skid-proof—Rut-proof—Rim-cut proof—Oil-proof and Gasoline-proof.

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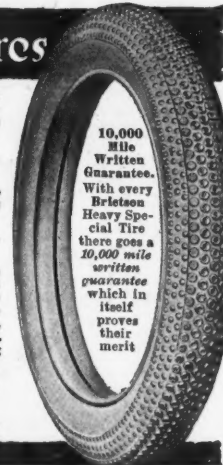
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Your Tires Can Be Made Like This ➔



If you are not in need of new tires and the fabric in your present tires is still good—we can rebuild them the Bricton Way—making them Puncture-Proof, Non-Skidding, Blowout-Proof, Rut-Proof, Oil-Proof, and Rim-Cut-Proof. Write today for full particulars, giving your dealer's name.

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10,000 Mile Written Guarantee. With every Bricton Heavy Special Tire there goes a 10,000 mile written guarantee which in itself proves their merit.

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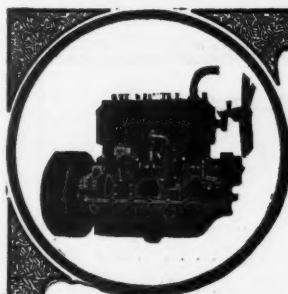
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Not made to meet a price,
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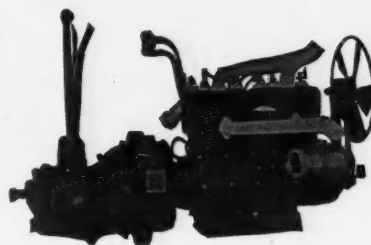
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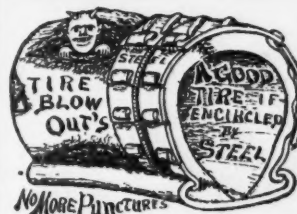
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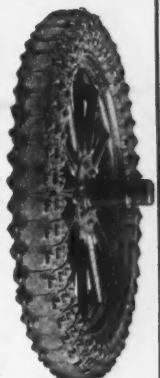
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Special prices to the first in new territory

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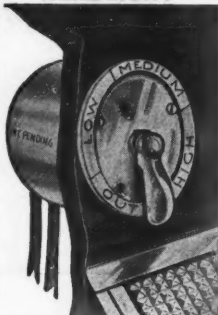
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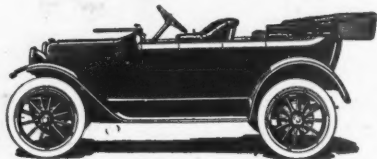
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Made by the oldest manufacturers of carburetors in America
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**Five
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Enclosed Valves, Three Point Suspension, Unit Power Plant, Platform Rear Springs, Full Floating Rear Axle, Left Hand Drive, Center Control, Drop Frame, Large Tires, Complete Ball Bearing Car.

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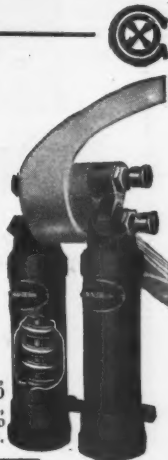
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World's First Maker of Sixes Exclusively

SPEEDSTER
TOURING CAR
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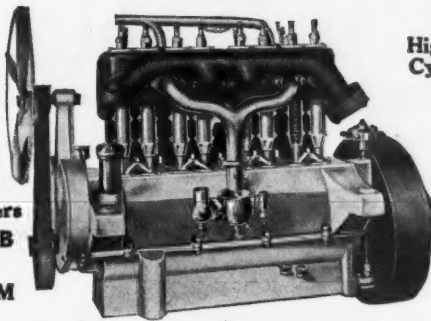
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"The World's Greatest Light Car"

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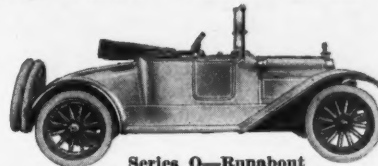
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Series O—Runabout

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Including Electric Starting and Lighting System

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"The wheel that makes any car modern"

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See Our Announcement

June 4th

issue this Publication

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96 Horse Power 80 Miles an Hour

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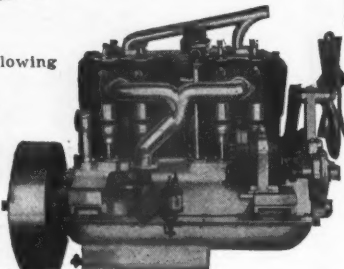
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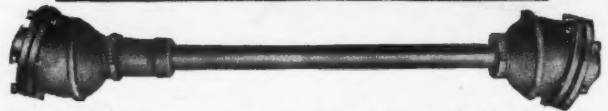
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Special FORD Model Prices \$5 and \$9

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Use the New Positive Lock Stop

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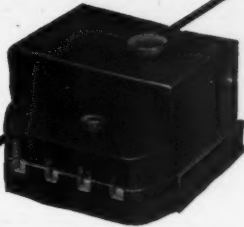
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regardless of its name will be benefited by the use of a

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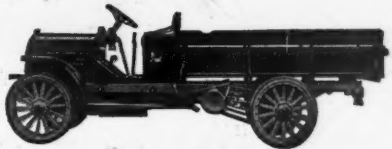
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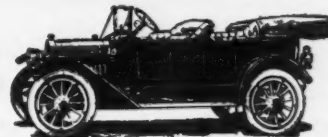
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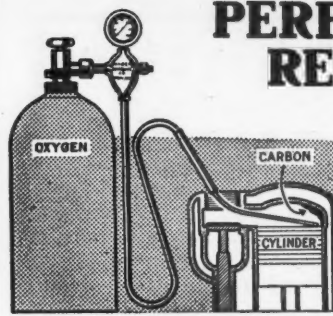
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More Power
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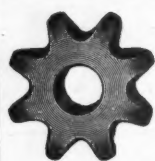
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20 PASSENGER SIGHT-SEEING BODY—
Very cheap. E. E. Behr, 750 30th St., Milwaukee, Wis.

FOR SALE—4 CYL., 20 H. P. UNIT POWER
plant. Complete with manifolds, carburetor, coil, timer, pump and radiator; all fine condition. \$75.00. Norman Bouas, Coulterville, Ill.

Parts and Accessories WANTED

WANTED—A SECOND-HAND FORD DE-
livery body; must be in good repair. Harry Clark, Belvidere, Ill.

WANTED—A THOMAS SURREY (TOR-
pedo) Body, 1912 style, upholstered, second hand, cheap. Give description. Lock P. O. Box 822, Greenport, L. I., N. Y.

WANTED—ONE 34x3½ BAKER DEMOUNT-
able rim. C. W. McCollm, New Market, Iowa.

WANTED TO BUY A SEVEN PASSEN-
ger or more bodies, or limousine new or second hand, and some three passenger seats. Merritt & Wills, San Marcos, Texas.

For Sale or Exchange

FOR SALE OR EXCHANGE—ONE TWEN-
ty-five foot motor boat, with four-cylinder engine, for runabout or roadster such as Overland, etc.; will consider one that needs overhauling, but no junk. Boat in A1 condition, but cannot use same; full particulars on request. E. E. Keller, Box 456, Eddyville, Iowa.

FOR SALE OR TRADE—¼ SEC. 6F GOOD,
level land in Sherman Co., Nebraska. Would take in good brick or cement building if location is satisfactory. A. F. Jenkins, Meadow Grove, Neb.

Help Wanted

WANTED—A NO. 1 SALESMEN TO SELL
the M-E Oxygen Generator, latest device for generating Oxygen Gas for cleaning Engine Cylinders and Oxygen-Acetylene Welding. Big seller, good profit; territory going fast. Write at once. Fisher, Richards & Todd, Hazleton, Pa.

WANTED—MACHINISTS, WELDERS AND
radiator repair men. Address Box E 120, care Motor Age.

WANTED—ONE OR TWO A-1 ALL-ROUND
auto mechanics. Steady work for right kind of men. Box E 116, care Motor Age.

Situations Wanted

A SUCCESSFUL SALESMAN—EXPERI-
enced in retail and wholesale automobile work, establishing agencies, organizing territory. Considered by many people a careful and expert driver. Prefer salary and commission. Experienced ad writer, can write follow-up sales letters that bring business; 28 years old; married; no children; no bad habits. Can furnish satisfactory references. Desire to change location. Now connected with largest distributor in middle west. Address Box E 109, care Motor Age.

AUTOMOBILE MECHANIC OF SEVEN
years' experience desires position in the west, south or north part of United States. Will go anywhere on thirty days' trial in truck or pleasure car service. No booze or cigarettes. Address Box E 117, care Motor Age.

POSITION WANTED AS AUTO REPAIR-
man, 5 years' experience; 23 years old; can give best of references. Address J. R. Williams, Brandon, Wis.

POSITION WANTED BY AUTO REPAIR
man and lathe hand with 3 years' experience. Am sober and mean business. Address Box E 119, care Motor Age.

WANTED—BY EXPERT DRIVER, POSI-
tion driving private car, race car, or car going on tour. Location no object if salary is good. Married and good habits. Address Box E 115, care Motor Age.

WANTED—POSITION AS CHAUFFEUR
and repair man; familiar with Franklin, Packard, Thomas, Pierce, Stoddard, Dayton, Chalmers, Studebaker, Oakland, Overland and Ford cars; 8 years' practical experience; married; age 30 years; want a change. H. H., 423 8th street, Niagara Falls, N. Y.

YOUNG MAN WITH SEVERAL YEARS'
experience as demonstrator, salesman, repairman and chauffeur. Desires position as demonstrator or salesman. But will consider anything you have to offer in my line. Can furnish A1 reference. Address Box E 118, care of Motor Age.

Business Opportunities

FOR SALE—A FIRST-CLASS GARAGE
and harness business combined; only one in good town; good reason for selling. Address Box 93, Prosser, Neb.

FOR SALE—GARAGE AND COMPLETELY
equipped machine shop, building, ground and tools, for \$3,400; no trades. For particulars write Jos. Slagel, Fairbury, Ill.

FOR SALE—GARAGE IN CITY 10,000.
Leading car agencies; machine shop fully equipped; also Ford agency; one other shop in city; large storing capacity. Address Box E 95, care Motor Age.

FOR SALE AT A BARGAIN—ONE OF THE
best locations for a garage and sales-room in Ohio. Building two stories, 175x45, over 15,000 sq. ft. of floor space. Ford Agency, large auto livery and accessory business; no better opportunity ever offered. Reason for selling retiring from business. Address Box E 101, care Motor Age.

FOR SALE CHEAP—PATENTS, OUT-
right, would trade for automobile or to manufacture same or royalty. Automobile illuminated license number box. A. M. Puckett, 1301 Ave. B, San Antonio, Texas.

PATENTED AUTOMOBILE IMPROVE-
ments open for manufacturing and foreign patents. They are simpler devices, reliable, convenient and cheaper; designed by an experienced automobile engineer. 1. A sheet metal accessory to sell \$1.80. 2. A machine job to sell at \$1.20. 3. One is very promising to revolutionize automobile transmission and rear axle; requires about \$8,000 for development. Write Box E 122, Motor Age.

Miscellaneous

REWARD FOR INFORMATION LEADING
to the recovery of Regal Underslung runabout stolen May 20 in Chicago. Lic. No. 76,134 Ill., motor No. 2,245; painted black with white stripe; gear shift lever has lock in top. Jas. DeMercer, 2841 Michigan Ave., Chicago.

CYCLECAR, MOTOR, TRANSMISSION,
wheels, axles, springs, steering, frames, tires, belts; new; \$150.00. Box 311, Fonda, Ia.

The Automobile HAND BOOK

NEW EDITION
By L. ELLIOTT BROOKES
Assisted by Other Well Known Experts
PRICE, \$2.00

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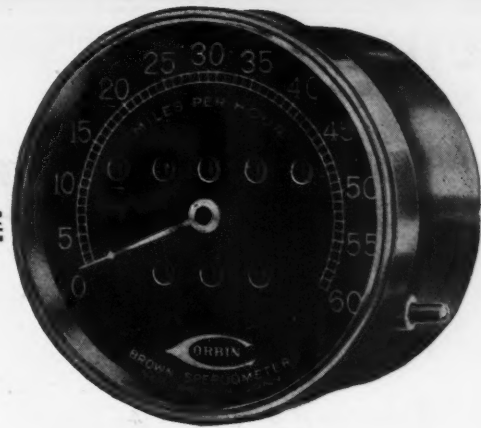
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A mechanism can be perfect only when the fundamental principle of its construction is correct.

The centrifugal principle is a natural law of physics.

It has been repeatedly proven correct by scientific and practical tests as the fundamental principle of speedometer construction.

It is embodied in the

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Because of this principle—centrifugal—the Corbin-Brown gains strength where the magnetic speedometer becomes weak—for instead of a number of complicated and delicate parts, easily damaged and broken, the Corbin-Brown's mechanism is the acme of simplicity. Its parts are few, large and strong. They minimize friction, reduce wear and insure the utmost in efficiency of service.

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The freedom of the Centrifugal speedometer from extraneous influences can not be questioned. Government experiments and actual road tests have well established this fact.

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THE AMERICAN HARDWARE CORPORATION,
Successors

New Britain, Conn.

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The Easiest Way to Tour Europe

A COMPILATION of American cars at European touring centers, made by the Paris edition of the New York Herald, shows the number of Packard registrations during the season of 1913 to have been greater than the total of all other cars listed.

As the only continental branch representing a high grade American car, the Packard Motor Car Company of Paris, 5 Rue Newton, is a center for motor tourists abroad. The establishment is equipped to assist in mapping out tours, arrange hotel accommodations, unravel customs entanglements and remove all impediments to entire relaxation and enjoyment.

If you contemplate making a foreign tour, you may wish to utilize the Packard European Rental Service. This enables you to engage a Packard car, fully equipped and operated by a competent driver, to be placed at your disposal at any time or place you elect. Gasoline, oil and tires are provided. You are relieved of all touring responsibilities.



A Packard in Rotenburg, Southern Germany

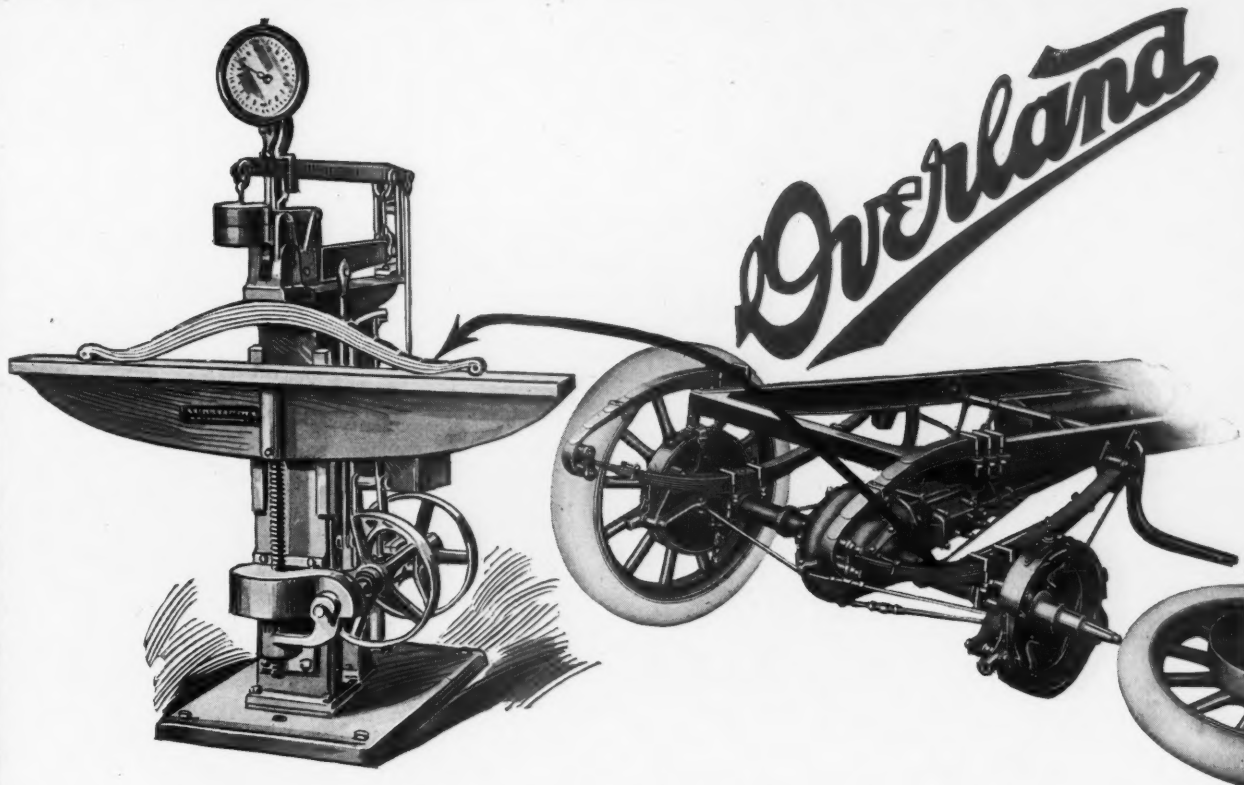
The Packard Motor Car Company of Paris recently has established a branch in London. The address is 7c Lower Belgrave Street, Victoria Station, London, S. W.

Cars should be engaged well in advance of starting dates. A folder containing information of value to all motorists touring abroad, will be forwarded on request.

Ask the man who owns one
PACKARD MOTOR CAR COMPANY, DETROIT

LICENSED UNDER KARDO PATENTS

LINCOLN HIGHWAY CONTRIBUTOR



We Prove Overland Spring Quality By The Most Severe Tests Known

THE steel used in Overland springs is as carefully chosen as that in the mainspring of the costliest watch. It must be absolutely perfect before our expert metallurgists accept it as fit for Overland service.

The machine shown above is a special device for testing finished springs. It has a capacity of 6,000 pounds. On it Overland springs are subject to millions of vibrations—a far more severe usage than they can ever receive in actual service.

If, at the end of the test, a spring shows even the smallest flaw or check in material or the slightest tendency towards distortion, it is rejected. Absolute perfection is the only standard we recognize.

The care exercised here is characteristic of Overland construction throughout. No part of the car is unimportant enough to escape the most severe test. Every part and every unit must measure up to Overland specifications—and these specifications are never short of perfection itself.

And because we manufacture Overlands in lots of 50,000, the buyer gets this perfect product for 30% less than smaller makers must ask for cars of like size and power.

The nearest Overland dealer will tell you more about this greatest of all medium-priced cars. Call on him today. Or write for our illustrated catalogues and descriptive literature. Please address Dept. 46.

The Willys - Overland Company, Toledo, Ohio

Manufacturers of the famous Overland Delivery Wagons, Garford and Willys Utility Trucks. Full information on request.

\$950

*Completely
Equipped*

f. o b. Toledo, O.

Electric head, side,
tail and dash lights
Storage battery
35-horsepower motor

Specifications

33 x 4 Q. D. tires
114-inch wheelbase
Mohair top, curtains
and boot

High-grade speedometer
Clear-vision, rain-
vision, windshield
Electric horn

\$1075

*With electric
starter and
generator*

f. o b. Toledo, O.

HUDSON Six-40 for 1915

A Trebled Output—31 New Features—a Record Price 3,000 Cars Oversold

On the HUDSON Six-40, the end of the 1914 season left us 3,000 unfilled orders. But it never will happen again. For 1915 we are going to build three times as many cars.

The demand for this car broke all HUDSON records. Almost over-night it grew to an avalanche after dealers received their cars. In the high-grade field there was nothing in sight of it—in lightness, in price, in beauty or equipment. It sold, as you know, for \$1,750—for a quality six-passenger Six.

A New Class in Sixes

The HUDSON Six-40 brought a new class to Sixes. They came faster than we expected. But there are tens of thousands more ready to come as soon as Sixes like this can be built for them.

There is nothing more evident than that men will have Sixes if they pay more than \$1,200. And a million men who are now driving Fours have ambitions to some time own a smooth-running Six.

These are facts which must be accepted. The overwhelming demand for the last HUDSON Six-40 is but a taste for what is coming. Any struggle to sell Fours for more than \$1,200 is fighting against an irresistible tide.

Now a New Sensation

In June will come out a new HUDSON Six-40. It has thirty-one distinct improvements. The price of this new car will mark an epoch in Motordom. We are trebling our output, which immensely cuts cost of production. And this coming Six-40 will undersell any high-grade Four ever built.

Our past-season model was mechanically perfect. The HUDSON engineers—the whole 48 of them—spent three solid years in perfecting it. And a season's use, in thousands of hands, has developed no shortcomings.

So this army of experts—headed by Howard E. Coffin—devoted all the past year to refinements. They have added new beauties, conveniences, comforts. And the coming model will set a new pace in the points that appeal most to buyers.

The Money Maker

We ask dealers to consider the following facts, then write us if they want an alliance.

The first HUDSON car was an instant success. It was designed by Howard E. Coffin, whose cars were always successful. Every year, for almost a decade, he has brought out the most advanced car of the year.

This success has grown until last season's sales exceeded \$13,500,000, with 3,000 orders unfilled. And now we are trebling our output.

We are now at a point where no quality Six can compete with us. With our present capacity, no rival can possibly give so much for the money.

The demand for Sixes, which is growing like a flood, is coming the HUDSON way. Ours is the lightest, the handsomest, the best-equipped Six. It is also the most economical.

In selling motor cars, the money hereafter will be made chiefly on Sixes. It matters not where you are. Farmers want Sixes as much as city men want them. Nearly every man around you who is driving a Four hopes some time to have a Six. And the HUDSON price enables tens of thousands to graduate now from their Fours.

The new HUDSON Six-40 will this year be the best-advertised car in America. We have doubled our appropriation. And every HUDSON advertisement will be written for us by the ablest man in this line.

We want to hear from dealers who would like to tie up with the most promising car of the time.

**Hudson Motor Car Company, 7892 Jefferson Ave.
Detroit, Michigan**